THE PENNY CYCLOPÆDIA

OF

THE SOCIETY

FOR THE

DIFFUSION OF USEFUL KNOWLEDGE.

VOLUME XV.

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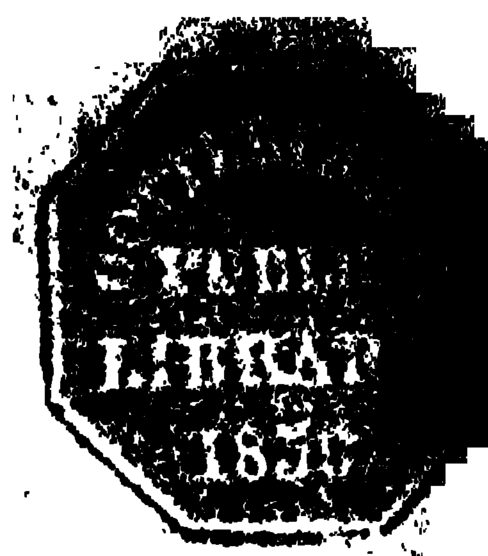
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THE PENNY CYCLOPÆDIA

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MASSA'GETÆ, an antient people of central Asia, in an expedition against whom Cyrus is said to have lost his life. (Herod., i. 201-216; Justin., i. 8.) It is difficult to determine their position; but it appears probable that they dwelt north of the Jaxartes (Sihon), in the country which is at present inhabited by the middle horde of the Kirghis. Herodotus says that they lived north of the Araxes, by which he probably means the Jaxartes (i. 201), and to the east of the Caspian Sea. According to Strabo, the Hyperborei, Sauromatæ, and Arimaspi dwelt above the Euxine, the Ister, and the Adriatic; and the Sacæ and Massagetæ above the Caspian (p. 507, Casaubon); and a little further he remarks that the Massagetæ were to the east of the Daæ, who bordered on the Caspian Sea (p. 511).

Herodotus was in doubt whether the Massagetæ ought to be reckoned among the Scythians (i. 201): but they were usually regarded as part of the Scythian nation by succeeding writers. (Arrian, iv. 17; Pliny, *H. N.*, vi. 19.) Herodotus appears to have used the name of Massagetæ to designate all the nomadic tribes of central Asia east of the Caspian; while he confined that of Scythia to the country north of the Euxine and the Danube. The similarity of their name (*Massa-getæ*; compare *Tyri-getæ*, *Thyssa-getæ*) would lead us to suppose that they were connected with the Getæ of Europe.

The Massagetæ are described by Herodotus as a numerous and powerful nomadic people, who resembled the Scythians in their dress and mode of life. Gold and silver were plentiful among them; but no iron nor silver was found in their country. They were however in a very low state of civilization even for a nomadic people. They had a community of wives; and their aged people were killed and eaten by their relations. (Compare Rennell's *Geography of Herodotus*, sect. x.; and as to the custom of eating their parents, the article BATTAS, and Moore's *Notices on the Indian Archipelago*, Singapore, 1837.)

MASSA'RIUM, a provisional generic name of Blainville for Alcyonium Massa of Müller.

MASSI'LIA. [MARSEILLE.]

MASSILLON, JEAN BAPTISTE, was born the 24th of June, 1663, at Hières, in Provence, and at a very early age entered the Collége de l'Oratoire* of that town; but his father, intending him for the profession of a notary, withdrew him before he had completed his studies. Massillon however eagerly seized every opportunity of returning, and his father was ultimately prevailed upon to allow him to re-enter the college, which he did in 1681, and commenced the study of theology under P. de Beaujeu, afterwards bishop of Castres. Here he read the sermons of Lejeune, and, being pleased with them, made some attempts in that species of composition himself, which, although acknowledged to be successful, did not satisfy his own taste. In 1696 he was called to Paris to direct the seminary of St. Magloire, where he composed his first ecclesiastical conferences, which, although differing in tone from his sermons, were not wanting in vivacity. Although a great admirer of Bourdaloue, Massillon did not take him for his model: he was desirous of opening a new way, and of searching the human heart, its secret passions and interests, in order to arrive at the motives and combat the illusions of self-love by reason and powerful appeals to the feelings. In the pulpit he appeared without gesture or any extravagant display of action; nevertheless when he grew animated, his look and deportment became so expressive, that at this time, when the orators of the pulpit were held in high estimation as patterns of declamation, the celebrated actor Baron, struck with the beauty of Massillon's style, exclaimed, 'There is indeed an orator, but we are merely comedians.' At Versailles he was as successful as he had been at Paris. The court of Louis XIV. was composed of men who might be touched though not convinced. Massillon felt this, and painted the passions with so much truth and such irresistible force, that even those whose vicious tendencies he exposed were constrained to love and admire him.

In 1704 he preached his second Lent sermon at the court, and with so much success that Louis XIV. promised he would hear him every two years; but for some reason unknown, Massillon was never again at Versailles. In 1709 he delivered the funeral oration of the Prince de Conti, which, though much applauded as delivered from the pulpit, was greatly criticised when it appeared in print. After the death of Fléchier in 1710, Massillon remained the last of the orators of the *grand siècle*.

In 1717 Massillon was made bishop of Clermont, and preached before the king his last Lent sermon, which is considered to be his *chef-d'œuvre*; and in 1719 was consecrated in the king's presence by Cardinal de Fleury. Massillon abolished in his diocese those indecorous processions that the ages of ignorance had perpetuated, and also certain superstitious customs spoken of in the *Origines de Clermont*. He died on the 18th September, 1742, of apoplexy.

The fame of this celebrated man stands higher than that of any preacher who has preceded or followed him, by the number, variety, and excellence of his productions, and their eloquent and harmonious style. Grace, dignity, and force, and an inexhaustible fecundity of resources, particularly characterise his works. His *Avent et Carême*, consisting of six volumes, may be justly considered as so many *chef-d'œuvres*. Massillon, in his sermons, endeavoured to convince the young king Louis XV. that he derived his authority from the people, and should never exercise it but for their advantage, nor deceive himself by thinking that he could do no wrong.

The most interesting of his works, next to his sermons, are his 'Conferences,' which are discourses addressed to the young ecclesiastics under his direction in the seminary of St. Magloire.

In a discourse entitled *De l'Ambition des Clercs*, he contends that the Church has no need of great names for its

* This College was established by Cardinal Berulle in the beginning of the seventeenth century.

support, but of exemplary virtues; and that profane manners and worldly inclinations, and not the humble origin of its clergy, are the things calculated to dishonour it. His discourse on the application of ecclesiastical revenues is strikingly prophetic, inasmuch as all the consequences which he foresaw have been verified in a remarkable manner. It is worthy of remark that his sermon 'on the small number of the elect' received the approbation of Voltaire, who observes that preachers in general would do better by repeating such models than by composing original discourses of inferior character. Massillon's works were collected and published by his nephew, in 12 vols. 8vo., in 1745 and 1746.

MASSINGER, PHILIP, born at Salisbury, in the year 1584, was the son of one of the earl of Pembroke's retainers,* who appears to have been employed as a special messenger to Queen Elizabeth. In 1602 he was entered at St. Alban's Hall, Oxford, where he was supported by the earl of Pembroke. Here, as Anthony à'Wood informs us, he spent his time in reading 'poetry and romances' rather than 'logic and philosophy, which he ought to have done, as he was patronised to that end.' Perhaps it is unnecessary to fall upon Anthony so harshly as Gifford does for this assertion. The biographer merely means to say that it was a kind of dishonesty to spend the time for which he was indebted to another person in studies alien to those which his benefactor wished him to pursue. Be this as it may, his works are a sufficient contradiction to the accusation of wasted time; and if the earl of Pembroke lost a chaplain, the world has gained what is worth many homilies.

Massinger took no degree, and also seems to have lost his patron's favour. The reason is uncertain, but Gifford supposes that the poet changed his religion at Oxford, and consequently alienated his Protestant friends. Whether he ever did change his religion at all rests on Gifford's inference from certain expressions in his works; but be this as it may, he was driven to betake himself to dramatic composition about the time of his arrival in London. It is probable that he did not for some years attempt anything beyond assisting others in the composition of plays, for we hear little or nothing of him as an author until the appearance of his 'Virgin Martyr' in 1622, sixteen years after his arrival in London. There is evidence moreover to prove that after Beaumont's death in 1615, he assisted Fletcher in the composition of some of the numerous plays (between thirty and forty) which appeared under that author's name during the succeeding ten years. During the rest of his life, Massinger was employed in writing plays, the last of which appeared only six weeks before his death, which took place the 17th of March, 1640, at his own house on the Bankside. His name is noticed in the Burial Register of St. Saviour's with the affecting addition 'a stranger,' showing that the poverty which had pursued him through life had not allowed him resting time enough to make himself known even to the clerk of his own parish.

Massinger's situation as last in order of time of the great dramatic poets of the sixteenth and seventeenth centuries, is probably the reason why he was so utterly lost sight of for seventy years after his death. The first thing we hear of his works is Rowe's intention of editing them, which he afterwards changed into an actual piracy, by which he adapted the 'Fatal Dowry' to suit the taste of the eighteenth century, under the name of the 'Fair Penitent.' That such an audacious forgery could have been palmed on the public and remain undetected for more than half a century is sufficient evidence what easy victims the reading public of those days must have been in the hands of fashionable authors.

In 1759 a bookseller's edition of Massinger appeared, which was followed in 1761 by another; and in 1777 by a third, edited by Monck Mason. On these editions Gifford, the last editor, throws many and apparently well-deserved slurs. Those who wish to see the whole controversy will do well to refer to the *Edinburgh Review* for 1808, where the battles of the earlier editors are fought with considerable prowess.

Gifford gives a complete list of Massinger's plays, with the dates of their appearance, which range from 1621 to 1640. They are thirty-seven in number, including those of which he wrote only a part, but which went under his name. Of these eighteen remain, and ten, if not twelve more, could have been added to their number had it not been for the detestable folly of Warburton, through whose carelessness the MSS. were destroyed by a servant.*

There is a peculiar interest in Massinger's plays derived from the state of the times in which they were written, and the bearing and influence which they must have exercised on those national feelings from which, as is probable, they took their own actual shape. No one who reads the play called 'The City Madam' can help seeing in it the exposition of a state of society likely to give birth to troubles, as well as the direct exhibition of many of those opinions and feelings which took such active part in the Revolution then impending. We see there portrayed a city opulent to extravagance, courtiers needy and unprincipled, and a landed proprietor of no family not scrupling to compare himself with one of the barons of the realm, and appearing to advantage as a blunt honest man contrasted with a noble, overbearing and insolent, though not intended by the poet to exhibit any vices except those incident to all members of his order.†

Still more striking are the political doctrines contained in 'The Maid of Honour.' Massinger is, we believe, the only dramatist of his time who did not either openly or in secret espouse the court doctrine of the divine right of kings. A line in one of Camiola's speeches is worth quoting, as it gives what is evidently the poet's view of the subject. She there says to the king of Sicily—

> 'When you are unjust, the deity
> Which you may challenge as a king, parts from you.'

And this is one of the numberless instances in which Massinger evidently conveys his own sentiments on questions then stirring, through the mouths of his characters. In fact, an analysis of the political references in Massinger's plays would be a work of great extent, as they abound in every scene, and at the same time one of no little interest, if it were only for the sake of possessing a commentary on the events and opinions of the day, by a man like Massinger.

Massinger's plays are distinguished by an almost entire abstinence from common oaths, and although we cannot add to this that they contain no coarse or even disgusting passages, we may, in respect to some of them, those for instance in the 'Virgin Martyr,' shift the blame from Massinger himself to his coadjutor in the composition. Whether this abstinence from profanity arose from the restraining influence of the growing prejudice against stage-plays, or from Massinger's own taste, we cannot now tell, but the delicacy, approaching to feminine, so evident in his writings, would induce us to ascribe it to the poet's own choice. On the whole however it is not too much to say that in dramatic power, in delicacy of expression, and in beauty of thought, he approaches more nearly to Shakspere than any of his contemporaries.

Massinger's extant plays are, 'The Old Law,' 'The Virgin Martyr,' 'The Unnatural Combat,' 'The Duke of Milan,' 'The Bondman,' 'The Renegado,' 'The Parliament of Love,' 'The Roman Actor,' 'The Great Duke of Florence,' 'The Maid of Honour,' 'The Emperor of the East,' 'The Fatal Dowry,' 'A New Way to pay Old Debts,' 'The City Madam,' 'The Guardian,' 'A Very Woman,' and 'The Bashful Lover.' (Gifford's Preface to Massinger; and the *Edinburgh Review* for 1808.)

MASSINISSA. [NUMIDIA.]

MASSOWAH. [ABYSSINIA.]

MASSURA'DA, or MESURA'DO, CAPE, is situated on the western coast of Africa, in 6° 20′ N. lat. and 10° 30′ W. long. It is formed by a hill about 400 feet high, steep on the west and north-west sides, but declining gradually in other directions. It forms the southern extremity of a bay which affords good anchorage in the dry season, but is open to the north-west. Massurada Bay receives the river Massurada or Rio Doro, which runs along the range of hills that terminates in the cape, and would fall into the sea close to the cape if it were not for a spit of land which runs from the latter in a north-north-east direction across the stream and turns it along the shore for about half a mile. At the mouth of the river is built the town of Monrovia, the principal place in the American settlement of Liberia. This settlement was formed in 1821, by the American Coloniza-

* His father's name has occasioned some dispute among the editors. Gifford asserts it to be Arthur, in which he is probably right.

* It is scarcely credible, but such is well known to be the fact, that Warburton, a man professing literary taste, actually left fifty-two manuscript plays in a place of common access for years, the consequence of which was that all except three were destroyed.

† The reader who will take the trouble to compare the Introduction to Guizot's 'History of the English Revolution' with this play will find the one an admirable commentary on the other.

tion Society, on nearly the same principles and for the same object as the English settlement at Sierra Leone. The Society acquired by purchase the country along the coast lying between Cape Mount and Trades Town in the kingdom of Sanguin, on the Grain-coast of Guinea, an extent of about 140 miles. Many small rivers water this coast; and though most of them are encumbered by shoals or rapids, boats of moderate size may ascend them for 40 or 60 miles, after which the navigation is usually impeded by cataracts. The country is generally level, and well adapted to the cultivation of Indian corn and rice. The rice raised here is highly prized. Several fruit-trees are indigenous, as the shaddock, and lemons; other fruits have been introduced. The mean annual temperature appears to be between 76° and 78°, and in the dry months (from June to October) the country is frequently visited by tornados or hurricanes from the north-west.

The inhabitants consist of negroes who have obtained their liberty in the United States or are born of free negroes, and such as have been taken from vessels engaged in the slave-trade. According to the laws of the Society, whites are not permitted to settle in this colony, with the exception of the agents of the company, some physicians, and missionaries. The blacks enjoy all the rights of free citizens, as in the United States themselves, and choose their own magistrates, among whom are two censors, who look after the morals of the inhabitants. In 1828 the number of the settlers amounted to 1200, of whom 700 were in Monrovia, but it is said that the number has considerably increased of late. The settlers are more occupied in trading with the neighbouring nations than with agriculture.

(Innes's *Liberia, or the American Colony of Free Negroes on the Coast of Africa;* and *West African Sketches.*)

MASTER OF ARTS. [ARTS.]

MASTERWORT, the old name of an umbelliferous plant with fleshy tuberous roots, growing in moist meadows and woods in the north of Europe and in Newfoundland. It has a stem from one to two feet high, broad twice-ternate leaves, flat large umbels of white or pink flowers, and thin orbicular straw-coloured fruit. Botanists call this plant Imperatoria Ostruthium; it has acrid, bitter, somewhat aromatic roots, and formerly had a great reputation as a remedy for toothache, and as a cure for agues, whence no doubt its names have been derived. It retains a place in continental medical practice, but it is disused in England.

MASTICH, a resin which is extracted from the trunk and branches of the Pistacia lentiscus by incision. This tree grows in the Levant, and particularly in the island of Chios. The fluid which exudes soon concretes into yellowish-white grains or tears, which are semitransparent, brittle, and have a slight but rather agreeable odour and taste. When thrown on burning coals, mastich gives a more penetrating smell. Its specific gravity is 1·074. It is composed of two resins, one of which is soluble in dilute alcohol, and the other is not; this last constitutes from 1-5th to 1-12th of the whole weight of the mastich, and possesses very nearly the characters of copal, it being soluble in absolute alcohol, æther, and oil of turpentine; these liquids also dissolve mastich without leaving any residue. When the portion which is insoluble in dilute alcohol is reduced to powder, and long exposed to the air, it is rendered soluble by the change which it undergoes.

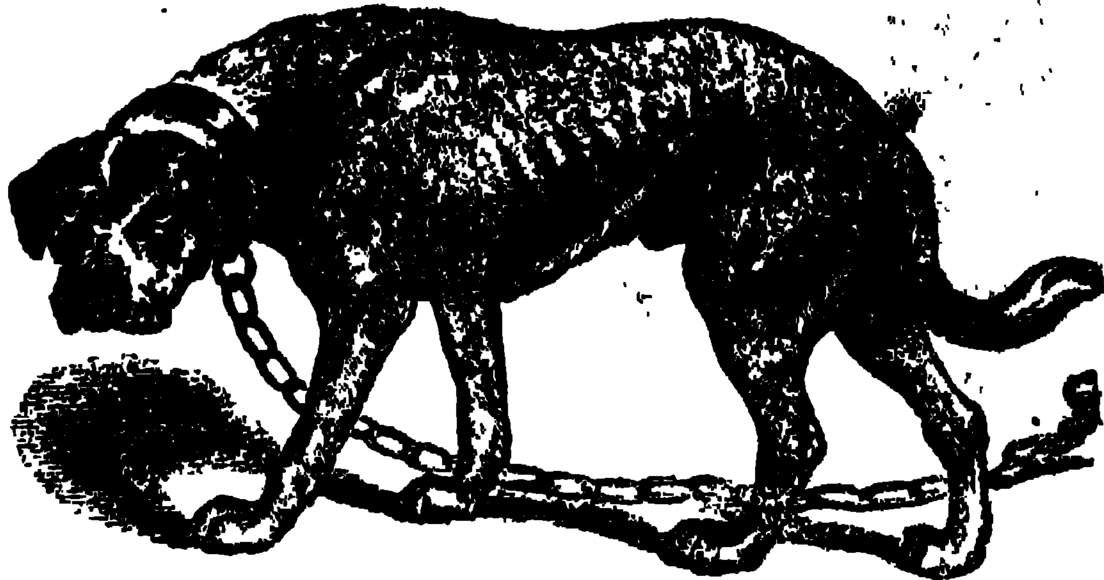
In foreign Pharmacopœias mastich is employed in several ointments, plasters, and fumigating powders; it is retained in the Materia Medica of the London Pharmacopœia, but does not enter into any preparation except as a tincture for preparing what is usually called *eau de luce*. Mastich is principally employed as an ingredient in varnish, and as a temporary stopping for carious teeth.

MASTIFF, the name of a variety of dog of a very old English breed, now seldom seen in its original state of purity. Manwood states that the word is derived from *mase thefese*, because it is supposed to terrify thieves by its voice, which, when the animal is excited, is fearfully deep and loud. This is the *Dogue de forte race* of Buffon and the French, the *Mastivus* of Ray, the *Canis Molossus* of Linnæus, and the *Villaticus* or *Catenarius* of Dr. Caius.

A true-bred mastiff is of considerable size, and very stoutly built. The head is well developed and large, the lips deep and pendulous on each side of the mouth, and the whole aspect noble.

It appears from Claudian and Gratius that the British dogs, mastiffs probably, were highly prized at Rome; and Camden notices the employment of a special officer, *Procurator Cynegii*, appointed in Britain for superintending the breed of these dogs and their transmission to that city, where they appeared in the combats of animals at the amphitheatre, and sometimes upon occasions even more cruel, for there can be little doubt that they were set to worry those unhappy Christians whom the tyrants of the time ordered to be sewed up in the skins of beasts and then exposed to the attacks of those powerful and savage dogs. Pennant quotes Strabo for the fact that the Gauls trained British mastiffs for war, and used them in their battles. According to Dr. Caius, three were a match for a bear, and four for a lion; but Stow mentions a lion fight with three of these dogs, in which, though two were disabled, and afterward died, the lion was so much harassed that he retreated, and refused to resume the battle.

The mastiff is capable of great attachment, and when kept as a guard is of unfailing vigilance, giving the alarm by its powerful bark, and never ceasing till it has roused the family or secured the intruder. It is now comparatively little used as a watch-dog, especially in great towns, where an active police has almost entirely superseded it.



Mastiff.

MA'STODON, the name of an extinct genus of gigantic Pachydermatous Proboscidian Mammals (*Mastotherium*, Fischer), whose remains are found abundantly in the third and fourth, or Pliocene, divisions of the tertiary fresh-water deposits, and also, but less frequently, in the deposits of the second or Miocene period.

In the greater portion of their organization the Mastodons must have closely resembled the elephants. The tusks, the proboscis, the general conformation of the body and the limbs, were very similar; and the principal distinction between the two genera was formed by the molar teeth. These indeed were gradually pushed forward from behind as they are in the elephant, and displayed the same relative increase in proportion as the animal was advanced in life; but, unlike those of the elephant, their crowns exhibited on cutting the gum large conical points of a mammiform structure, whence the animal derives its name. As these conical points were worn down by mastication, the tooth presented disks more or less large according to the degree of attrition which it had undergone. The following cuts, which are very much reduced in size, as will be understood from what we have already stated, will explain this difference in the tooth more clearly than words. Before the tooth has suffered from detritus it presents the following appearance:—



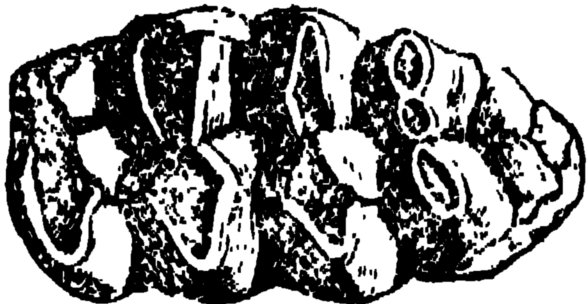
Molar tooth of Mastodon, not worn.

And after exposure to a comparatively small degree of detrition it has the aspect represented in the following cut.



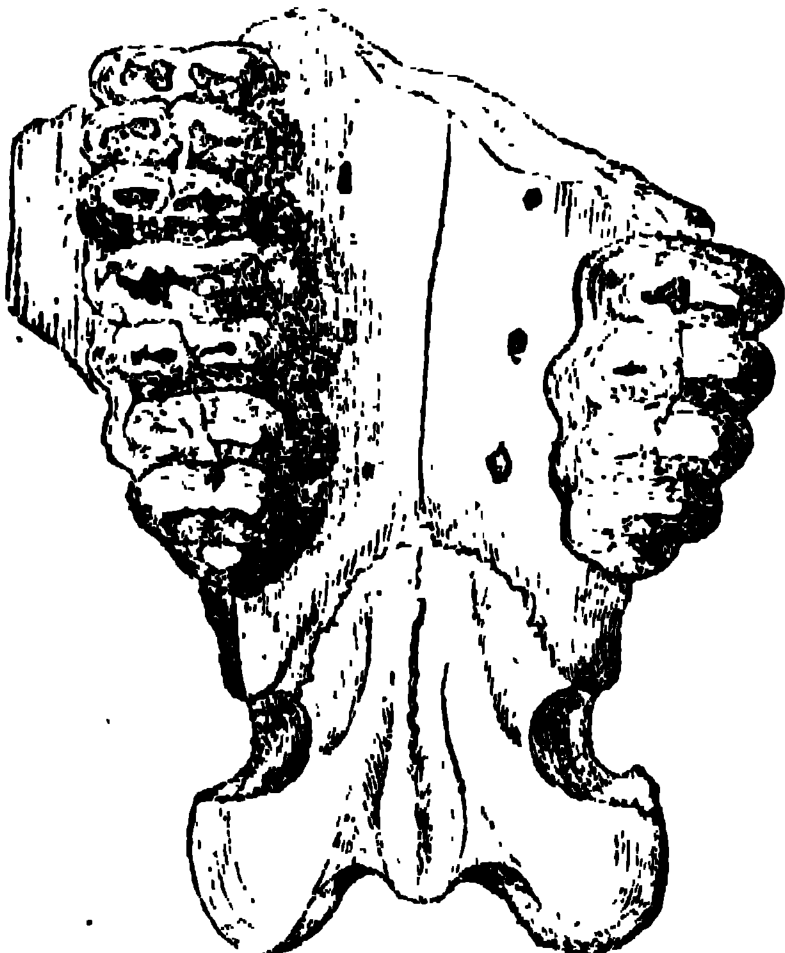
Molar tooth of Mastodon, slightly worn.

But when from longer use the conical teat-like points are more deeply worn down, the following appearance is presented.



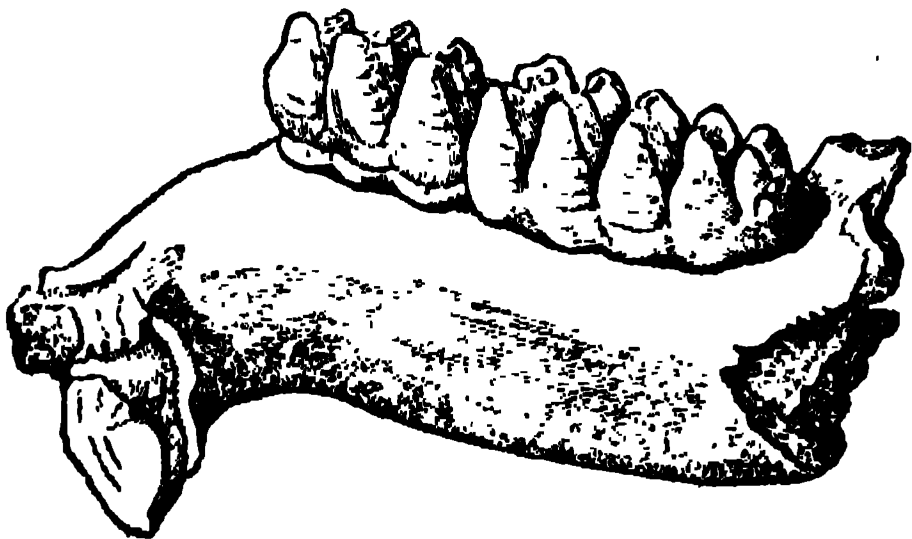
Molar tooth of Mastodon, a good deal worn, seen from above.

The way in which these teeth are set in the upper jaw will be seen from the following cut.



Molar teeth and palate of Mastodon.

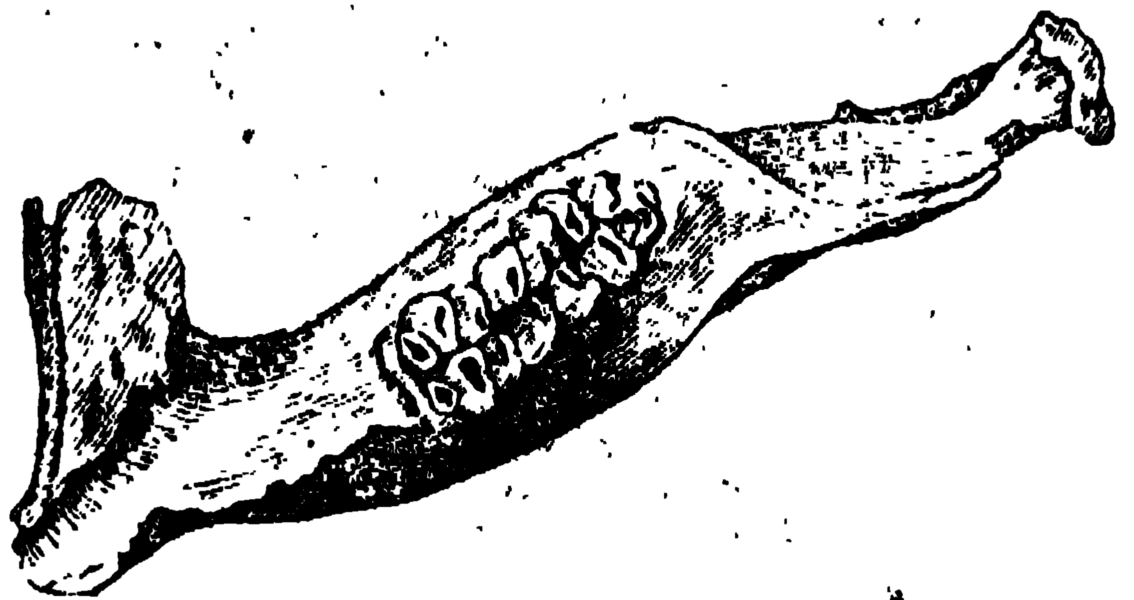
And the mode in which those of the lower jaw are arranged will be perceived from the figures given below.





Portions of lower jaw of Mastodon.

The general contour of the lower jaw as viewed from above may be collected from the following figure.



Portion of lower jaw of Mastodon.

The remains of the *Great Mastodon*, *Mastodon giganteus*, Cuv., appear to have been the first that attracted attention. These occurred in considerable abundance in North America. They gave rise to much speculation and much erroneous opinion, at first; for though the form and size of the molar teeth forbade the inference that they could have belonged to any of the large existing animals, the formidable appearance of the pointed conical tuberosities of the crowns led to conclusions directly the reverse of truth, as we shall presently see. Daubenton, indeed, at first thought that some of these teeth belonged to the Hippopotamus, but he soon perceived that they must have formed part of an animal which had no recent analogue, and Buffon announced that the whole evidence afforded by the remains led to the belief that this antient species, which ought to be regarded as the first and the largest of terrestrial animals, existed only in the first ages of the world ('n'a subsisté que dans les premiers temps'), and never had come down to our time. This opinion of Buffon did not extend beyond the larger molar teeth, and he still regarded the middling sized and worn teeth as those of the Hippopotamus; he also followed Daubenton in considering the femur found with the teeth as that of an elephant, though Dr. Hunter (William) had pointed out the differences between it and the same bone in the elephant, as well as the distinctions existing in the teeth and lower jaw. (*Phil. Trans.*, vol. lviii.) But while William Hunter did this good service, he introduced no small confusion and error. He had heard of the Siberian *Mammoth*, and not having seen the bones of that animal, he immediately concluded that it was identical with the North American fossil, and gave the name to the latter, a nomenclature which was for some time adhered to both by the Anglo-Americans and the English. The skeleton of the Great Mastodon was exhibited at London and Bristol as the *Mammoth*, and accounts of it under the same name were published in London in 1802 and 1803. Nor was this the only error of which William Hunter was the parent, for notwithstanding the rejection of such an opinion by Camper, the former declared that, from the structure of the teeth, the *Mammoth*, as he termed it, was carnivorous; and men, ever prone to catch at the wild and wonderful, greedily adopted this marvellous view, and named the gigantic beast the *Carnivorous Elephant*. We well remember in our early youth hearing the speculations of some as to the sort of prey on which the monster lived, and as to the great services that its enormous tusks, which in the skeleton above noticed were placed in an inverted position, with the curvature downwards, must have rendered when the animal was on its predatory excursions. The confusion created by the application of the same name *Mammoth* to two different genera was great, and for a long time almost inextricable, notwithstanding the endeavours of Pallas, who clearly refuted the supposed identity of the Siberian and American animals, by showing that the Siberian *Mammoth* is a true elephant. Cuvier at once dissipated the clouds that had gathered over the subject, and while he clearly pointed out the osteological differences between the two genera, gave to the supposed *Mammoth* of America the appropriate name of *Mastodon* (Μαστὸς, a teat; ὀδοὺς, a tooth).

The first notice of the teeth and bones of this extinct genus of pachyderms appears to be in 'Phil. Trans.' (vol. xxix., 1714), a century and a quarter ago; and it is not uninstructive to observe what rapid strides natural science has made since that time, when the Royal Society of London published in their Transactions Dr. Mather's letter to Dr. Woodward, in which the former gives an account of a large work in MS. in two vols. folio, but does not name the author. Dr. Mather recommends this

work, which appears to have been a commentary on the Bible, with large philosophical remarks,' to the patronage of some generous Mecœnas, to promote the publication of it,' and transcribes, as a specimen, a passage announcing the discovery, in 1705, of enormous bones and teeth at Albany in New England, as the bones of a giant, appealing to them as a confirmation of the text in *Genesis* (vi. 4); another example, if any were wanting, of the folly and danger of mixing up religious questions with scientific inquiries. Portions of remains were sent to France and England at different intervals, and elicited the observations of European zoologists, whilst in America materials were collected for forming two complete skeletons by the zealous industry of Mr. Peale.

Of these two skeletons one was placed in the museum of Mr. Charles Wilson Peale in Philadelphia, and the other was exhibited in London and Bristol by his son Mr. Rembrandt Peale, who published two accounts of it under the name of the *Mammoth* above alluded to.

One of the principal deposits of Mastodon bones appears to have been the Big-bone Lick in the north part of Kentucky, near the Ohio, whence the Mastodon has been called 'the animal of the Ohio.' None of the remains have the appearance of having been rolled, but seem to have been unmoved since the death of the animal; and it is worthy of remark that those which were found at the river of the Great Osages, which runs into the Missouri a little above its confluence with the Mississippi, were in a vertical position, as if the animals had been bogged or buried in the mud. [MEGATHERIIDÆ.]

The traditions which were rife among the Red Men concerning this gigantic form and its destruction must not be passed over in silence. M. Fabri, a French officer, informed Buffon that the savages regarded these bones scattered in various parts of Canada and Louisiana as belonging to an animal which they named the *Père aux bœufs*. The Shawnee Indians believed that with these enormous animals there existed men of proportionate development, and that the Great Being destroyed both with thunderbolts. Those of Virginia state that as a troop of these terrible quadrupeds were destroying the deer, the bisons, and the other animals created for the use of the Indians, the Great Man slew them all with his thunder, except the Big Bull, who, nothing daunted, presented his enormous forehead to the bolts, and shook them off as they fell, till, being at last wounded in the side, he fled towards the great lakes, where he is to this day.

Buffon seems to have been the first who noticed the occurrence of these teeth in the Old World, and figures one alleged to have been found in Little Tartary, and given to him by the Comte de Vergennes. This is very large, having from eight to ten points and weighing eleven pounds four ounces. He also figures another from the museum of the Abbé Chappe, said to have been brought from Siberia. Pallas announces another instance; and gives a figure of one from the Oural Mountains. Cuvier states that he for a long time thought that his *Mastodon giganteus* inhabited the Old Continent as well as America, but he confesses his doubts as to this point. The Abbé Chappe, he remarks, had been in California, and there is no certain evidence that he brought back his Mastodon tooth from Siberia. The tooth figured by Pallas, he thinks, may perhaps have belonged to *Mastodon angustidens*, and he asks, who shall assure us that the Comte de Vergennes was not in error as to the locality of the great molar presented by him to Buffon, and which, together with that formerly in the cabinet of the Abbé Chappe, is in the Paris Museum? Cuvier sums up by saying that he does not entirely pretend to invalidate these three proofs, but that he begins no longer to regard them as sufficient.

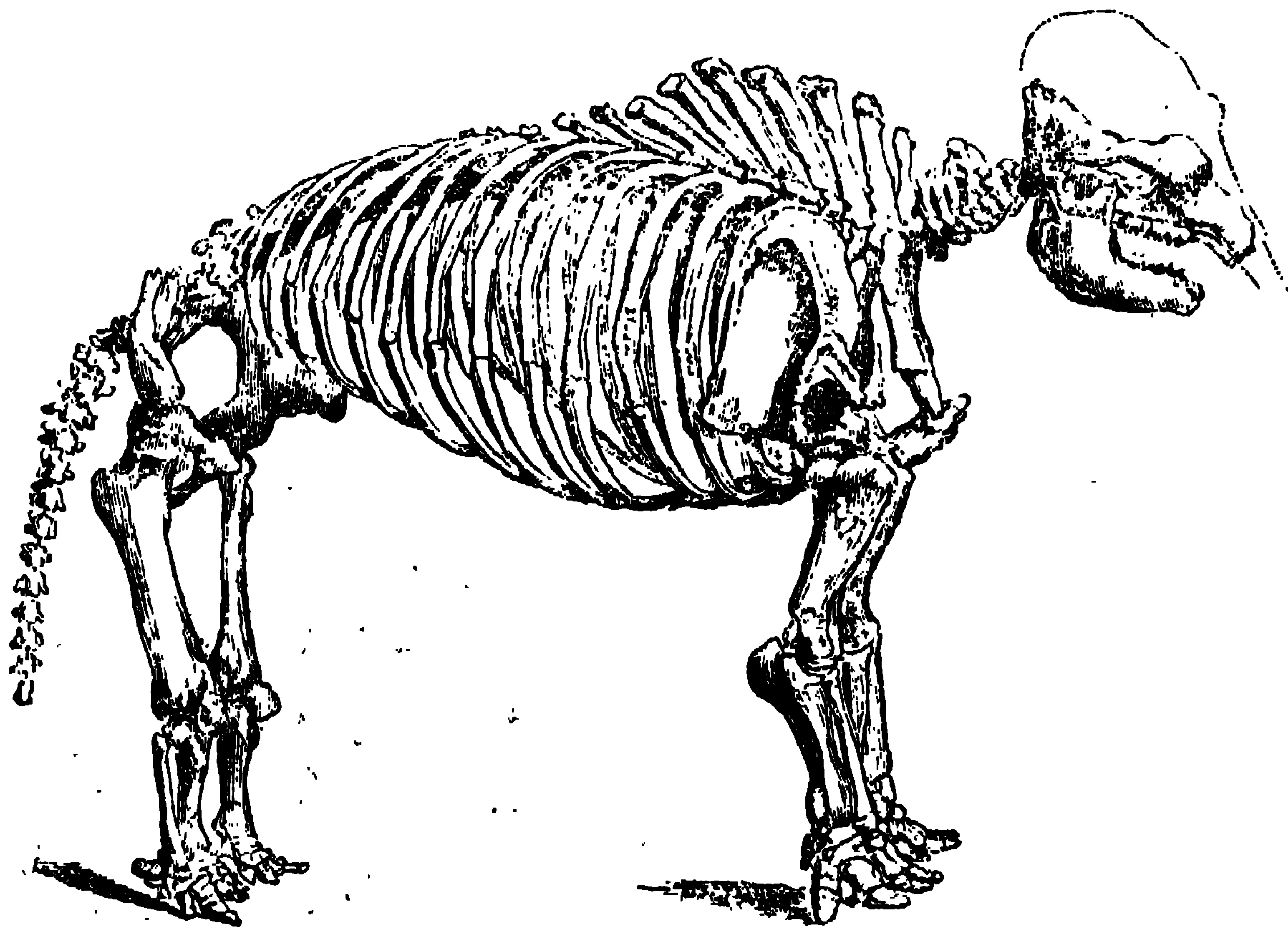
The following species have been named: *Mastodon giganteum*,* *M. angustidens* (Europe, America?), *M. Andium* (Andes), *M. Humboldtii* (Concepcion–Chili), *M. minutus*, *M. Tapiroides*, *M. Turicensis*, *M. Arvernensis* (Epplesheim, Puy de Dôme), *M. elephantoides* (Irawaddi, Sewalik Mountains), *M. latidens* (Irawaddi, Sewalik Mountains), and *M. longirostris*, Kaup. Professor Owen has referred the teeth from the Norfolk crag to the last-named species.

Example, *Mastodon giganteus* (Cuv.)—Syn., Mastodon maximus (Cuv.), *Mammut Ohioticus* (Blum.), *Harpagmotherium Canadense* (Fisch.), *Elephas carnivorus* (Gol. Hunter), *Mammoth* of William Hunter and of the Anglo-Americans.

Young.—Tetracaulodon. (Godm.).

Localities.—The United States. Europe?

This species must have equalled the Elephant in height, but seems to have been longer and stouter in its proportions.



Skeleton of Mastodon giganteus.

Remains of *Mastodon* were found by Capt. Cautley in the Sewalik Mountains; and in assigning an age to the formation, the Captain adopts the views of Dr. Falconer, who considers the deposit to be synchronous with that from which Mr. Crawfurd obtained the remains near Promo, on the banks of the Irawaddi. Captain Cautley having found jaws in which the front teeth are not to be distinguished from the teeth of *M. latidens*, and those in the rear from the teeth of *M. elephantoides*, he conceives that the distinction which was established on detached teeth will be found to be erroneous.

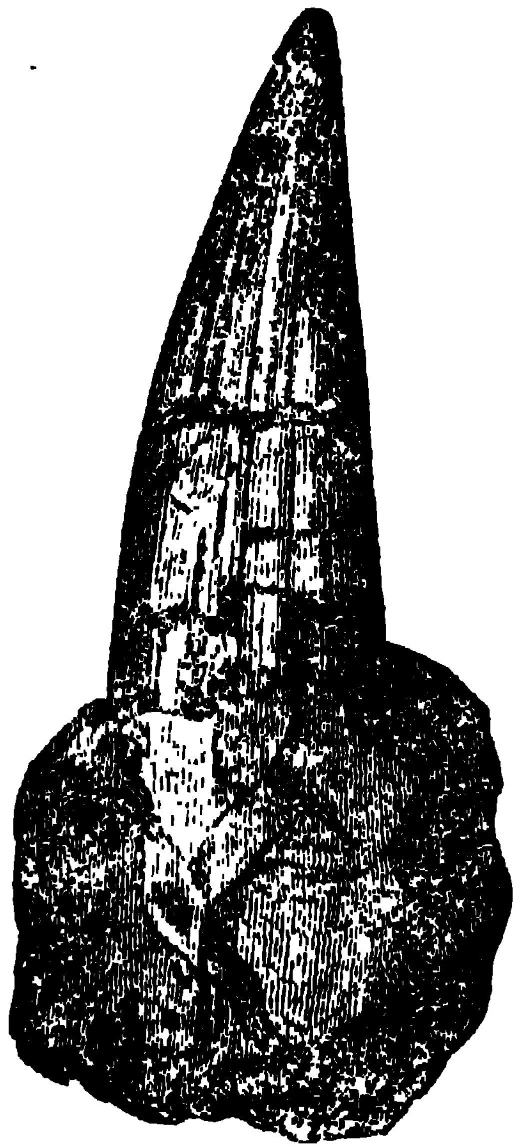
The genus *Tetracaulodon* of Godmann is, according to the best authorities, the young of the *Great Mastodon*—*Mastodon giganteus*. One species only, *Tetracaulodon Mastodontoideum* (Godm.), is recorded. (Harlan, *Bull. des Sc. Nat. et de Géol.*, 1830.)

MASTODONSAURUS, Dr. Jæger's name for an extinct

* Giganteus properly.

saurian found in the *alaunschiefer*, or alum slate (Würtemberg), founded upon teeth, the largest of which, with part of the stone adhering, is figured below, one-half of the size of the original. The other teeth were considerably smaller.

Dr. Jæger is of opinion that these teeth must be held to approach the nearest to those of the animals belonging to some of the species of *Monitor*. The *Mastodonsaurus*, from the length of its teeth, may be said, in his opinion, to have equalled the *Mosasaurus* of Maastricht in size; but in the formation of the teeth the former differs from the latter. The small teeth, he observes, agree so much in every respect with the large one, that their difference in size is only to be ascribed to their having belonged to animals of a different age, but not of a different genus, and also to their having occupied different places in the jaw.



Tooth of Mastodonsaurus.

(Dr. Jæger's memoir, *Uber die Fossile Reptilien welche in Würtemberg aufgefunden worden sind*, Stuttgart, 1828.)

MASULIPATAM, a district of the province known as the Northern Circars in Hindustan. It is bounded on the north by Rajamundry, on the east by the Bay of Bengal, on the south by Guntoor, and on the west by the dominions of the Nizam. The district which now goes under the name of Masulipatam comprises three of the five original Northern Circars, viz. Condapilly, Ellore, and Masulipatam, and forms a collectorate under the English government. The population amounted, in 1822, to 454,754, and the public revenue to about 150,000*l.* This district contains a large proportion of uncultivated grass-lands, and towards the north there is a great deal of jungle. The principal produce is grain, and some cotton of good quality is raised.

MASULIPATAM, the capital of the district, is a seaport of some consequence, in 16° 10′ N. lat. and 81° 14′ E. long. About a mile and a half south-east from the town is a fort in the form of a parallelogram, 800 yards long by 600 yards broad: there is a straight causeway between the fort and the town upwards of 2000 yards long. There is a considerable manufacture of chintzes in the town and neighbourhood, great quantities of which are exported: they are much esteemed in the greater part of Persia. This is almost the only part of that line of coast on which the surf does not beat; it affords good anchorage for ships of 300 tons burthen. The French established a factory at this place in 1750. It was taken by assault in 1759, by the English under Colonel Forde, and has since continued in our possession. Masulipatam is 203 miles from Hydrabad, 292 miles from Madras, 764 from Calcutta, and 1084 from Delhi, all travelling distances.

MATABUNGA. [Hindustan.]

MATAGORDA. [Mexico.]

MATÂPAN, CAPE. [Laconica.]

MATARO′, a seaport of Cataluña in Spain, in 41° 33′ N. lat. and 2° 30′ E. long. It is said to have been founded by the Romans, and to be identical with the Iluro of Ptolemy and Pliny, but the Roman city was farther inland than the existing town of Mataró, which was founded and named by the Arabs.

The more antient or Moslem part of Mataró stands on a rising ground at some distance from the sea; it is small and enclosed with walls; the streets are narrow and gloomy, with the exception of one called La Riera, which is broad, straight, and handsome, and intersects the town. The modern part of Mataró is of much greater extent, and stretches eastward down to the sea. It is laid out in streets, long, broad, and regular; the houses are neat, and many have their façades painted in fresco as is common in Spain and Portugal. One parish church, five convents (now unoccupied), and an hospital, are the principal public buildings. The population at the commencement of the present century was about 25,000, and was increasing rapidly, but must now be estimated much lower. The manufactures and commerce of Mataró at the same time, owing to the industrious and enterprising spirit of the inhabitants, were in a most flourishing condition, but the loss of the American colonies, to which this town used to export calicoes, laces, velvets and other manufactures in silk, gave the death-blow to its prosperity.

The scenery in the neighbourhood of Mataró is exceedingly picturesque. Inland from the town extends a small but most fertile and cultivated plain, the farms in which, says Townsend, are so many gardens, watered by artificial means, 'and producing on the same spot of ground corn, wine, oranges, and olives.' Bounding the plain are ranges of mountains, whose slopes are luxuriantly clothed with wood. The red wine grown in the plain of Mataró is esteemed the best in Cataluña.

(Laborde, *Itinéraire Descriptif de l'Espagne*; Townsend's *Journey through Spain*; Inglis's *Spain in* 1830.)

MATE′. [Paraguay Tea.]

MATE′RIA ME′DICA is that branch of medical science which treats of the articles employed in the practice of medicine, and embraces an explanation of the nature and modes of action of those substances which are had recourse to in order to restore the healthy state of the human frame when its functions or structure are impaired by disease. Thus defined it comprehends both pharmacology and therapeutics. The former means an account of drugs, simple or prepared, in reference to their physical character, natural history, commercial history, chemical composition, and modes of exhibition. The latter means an exposition of the principles which should regulate their employment. The pharmacological part of the subject is sufficiently treated of under each article, as it presents itself in alphabetical order, and it is only requisite to treat here of the general principles involved in their practical application. For the full and satisfactory comprehension of this department, a previous knowledge of the structure of the body, or anatomy, and, above all, of general anatomy, and of the respective duties or offices performed by its component organs while in a state of integrity, or physiology, and of the various degrees of departure from these, when from any cause they become deranged in their action, or pathology, and the signs by which the morbid states are indicated, or nosology, is required. These departments of science are studied only by those persons who intend to follow the medical profession, and at their hands only can a skilful employment of medicines be expected. Something however may be done for the advantage of the public by pointing out how medicines act, and in what way they prove remedial. The object of the administration of a medicine is to arrest the progress of diseased action, and to remove the consequences of its existence, that is, to restore the individual to perfect health, such as he enjoyed before the organ or organs received the impression of the morbific cause; or where both or either of these objects cannot be accomplished, so to retard the career of the unhealthy operations, as to prolong life to the latest possible period. To improve and perfect this most important branch of the healing art is the end and aim of all the other branches of medical science. The means of accomplishing this object have varied in the different stages of human civilisation, and according as different theories of the nature or cause of diseases have prevailed. Many of the medicines formerly in use were of a disgusting or repulsive nature, or of a kind devoid of any active principle, and therefore inert. Many also owed their introduction into practice to superstition, credulity, or a misapplication of the principles of natural and chemical philosophy, and have long been discarded by scientific prac-

titioners, though frequently retained by the populace or by quacks. The medicines used in the present day are still drawn from all the three kingdoms of nature, though the animal kingdom yields few, the vegetable kingdom a considerable number, and the mineral kingdom the greatest number and the most active.

In general few articles produce much effect on the human frame, either in a state of health or disease, which are not possessed of marked sensible qualities, impressing the senses of smell or taste in a distinct manner. Hence bland insipid articles are mostly better fitted to furnish nourishment than medicines, being completely digested, and creating no disturbance or change of action of the vital powers of the system; medicinal substances on the contrary do not appear to be thoroughly digested, but a portion remaining unassimilated acts in some measure as a foreign body, and produces a stimulant or alterant effect on the vital power. Many medicines are indeed absolutely poisonous if given in large doses, or where no diseased state of the system requires their administration. For disease often gives to the system a power of sustaining the action of a dose of medicine which would produce serious disorder if given to a person in health; the morbid state of the system seeming to act as an antidote to the medicine, while the medicine acts as an antidote to the disease—health being the result of their neutralizing power.

Medicines produce two distinct effects: one termed the primary, or in some cases, as when given to a healthy person, the physiological effect; the other secondary, or curative, which can only take place when there exists a disease to be removed. The former is generally uniform or constant; the latter too often variable and uncertain. To lessen the degree of uncertainty in the latter and most important of the two kinds of action, many zealous medical men have instituted experiments with different medicines on themselves or others; while chemists have carefully investigated the chemical composition of the articles, and sought to discover their active principles, or to explain their modes of action. Notwithstanding these valuable aids, therapeutics is still the most imperfect of all the departments of medical science, partly from the difficulties inherent in the subject, and partly from inability in medical men to weigh correctly the evidence respecting the effects of medicines. The union of several articles in one prescription, by which we attempt by one stroke to remove several symptoms, tends still further to obscure the results, and to vitiate the conclusions which may be drawn. The polypharmacy of the antients has been in a great measure abandoned, but still it must be confessed that simplicity in prescribing is not sufficiently studied. (Holland's *Medical Notes and Reflexions on Medical Evidence*, and on *Methods of Prescription*.) On the opposite hand, the attempts to isolate the supposed active principle of many vegetable remedies, and to administer it apart from the others, though in some instances advantageous, by diminishing the size of the dose, or concealing the unpleasantness of the taste, have not produced the consequences expected; for example, in most cases *cinchona bark* administered in some of the old preparations will be found a more valuable tonic than *quinine*. The superiority of many mineral waters, which contain a variety of ingredients in a state of extreme dilution, over the exhibition of the saline materials in a less quantity of liquid, seems to militate against the practice of excessive concentration.

The introduction of new substances into the Materia Medica, by the discovery of new plants, or by the progress of chemistry, may supply deficiencies in the catalogue of remedies. But less benefit to mankind will flow from a multiplication of remedies, than from the establishment of clear and scientific rules for their administration. Every improvement in anatomy and physiology will promote the advancement of therapeutics, by leading to greater precision in the employment of medicines. For nothing is more certain than that medicinal substances act upon special parts of the body, in preference to others, and in many instances on those which are diseased rather than on those which are sound. The careful investigation of the modes of action of medicines is worthy of the best faculties and energies of medical men, and every contribution to this department of science should be regarded as an incalculable benefit conferred on mankind.

(Pereira's *Elements of Materia Medica*; and Vogt, *Lehrbuch der Pharmakodynamik.*)

MATERIALISM is a name applied to any philosophical system which denies the existence of a spiritual or immaterial principle in man, called the mind or soul, distinct from matter, or which (changing the phrase) denies the immateriality of the soul. The name is applied to systems which differ very widely from one another, in respect of the consequences deduced from the denial of the soul's immateriality: and thus it comes to pass that the popular meaning of the word has become loose and incorrect, comprehending what are no better than accidental consequences of the pure and proper idea. Such accidental consequences are the denial of a future state and absolute atheism; and it need not be said that atheism and materialism are treated in current conversation as convertible expressions.

The name materialism also is one of that sort for which Mr. Bentham has constructed the epithet *dyslogistic*. As applied in current conversation, it always carries with it censure. This arises, of course, from the nature of the accidental consequences which have been indicated, and which mankind regard with horror: but inasmuch as the name still continues to be applied to systems from which unchristian and atheistical consequences are expressly excluded, and even to some systems (such as that of Hartley) which admit the existence of a separate soul, but in whose method of explaining mental phenomena there is a dash of materialism, the censure that has come to be indissolubly associated with the name often falls with grievous injustice. Indeed there is hardly a single word in the whole range of philosophic terminology better fitted to exemplify the evils of looseness of application, or of allowing feelings to tinge and discolour the notions conveyed by names.

The systems to which the name materialism is applied may be roughly distributed under a threefold division. First, it is applied (as has been already said) to a system like that of Hartley, which admits the existence of a soul, but which, attempting to explain mental phenomena physically or by movements arising out of the bodily organization, seems to imply materialism. Secondly, it is applied to the systems of Hobbes and Priestley, and of the French school of writers, of which De la Mettrie may be taken as a specimen, which distinctly deny the existence of a soul as a separate principle in man, but which do not deny either a God or a future state. In the systems of these writers is evolved the pure and proper idea of materialism, divested of all unnecessary consequences. Thirdly and lastly, the name is applied to systems like that of the antient Epicureans, or of Spinoza, which deny both a future state of rewards and punishments and a Divine Creator, systems for which atheism would be the better name, inasmuch as materialism fails to denote their more important and distinctive ingredients.

The following is a brief summary of the views of Dr. Priestley, who has more formally than any other writer enunciated the principles of materialism in the pure and proper sense of the word. He denies the existence of a separate immaterial principle in man, called the mind or soul, because he thinks that an immaterial principle could not exist in union with the material body, and because he thinks further that all mental phenomena (as they are called) may be explained by means of supposed movements arising out of the bodily organization. The method by which he thus explains mental phenomena is that of Hartley. [HARTLEY.] Adopting this philosopher's hypothesis of medullary vibrations, he defines mental phenomena as medullary vibrations perceived; and he contends, principally from the analogy of brutes, that bodily organization is adequate to produce perception. Thus, and by means of such hypothesis, does he dispense with the hypothesis of a separate immaterial soul. But denying the existence of a soul, separate from the body, and capable of surviving when the body perishes, he does not yet deny the immortality of man, and a future state of rewards and punishments. On the contrary, he distinctly affirms these on the authority of Scripture. It is needless to add that Dr. Priestley does not deny the existence of a God. [PRIESTLEY.]

One word more on the absurdity of coupling the denial of a future state with the denial of an immaterial soul, and of making atheism synonymous with materialism. To deny a material soul is necessarily to deny an immortal soul, but not therefore to deny an immortal man. And even to deny the existence of everything save matter in the universe, is not necessarily to deny a Divine principle, as is shown by many of the antient schools of philosophy [ELEATIC PHILOSOPHY], nor even to deny a moral Governor, as is shown by the philosophy of Hobbes, who, denying in one part of

his writings the existence of all spirit, and in this respect carrying his views further than Dr. Priestley, yet makes God the corner-stone of moral and political science. [HOBBES.] Hobbes distinctly says that there being nothing, in his opinion, but matter in the universe, it follows that God is matter.

But it is to be remarked in opposition to materialism, even as it is put forth by Dr. Priestley, that it is devoid of philosophical foundation, and rests on a disregard of the limits of true philosophy. Its truth cannot be tested by observation. It rests altogether on hypothesis and conjecture. When we go beyond what are called the qualities of the mind, or of matter either, and speculate upon what it is itself, whether it is something else, or different from that something, whether it has or has not an existence, we have no help but in supposing and conjecturing and imagining. Such speculations may doubtless be interesting, and they may have their use too as an exercise for the imagination, but we cannot calculate upon their results. Much mischief is done moreover by mixing up these results with the results of observation, by jumbling together conjecture and philosophy. The true philosopher, not despising, but setting aside as irrelevant to his object, all speculations on the origin and nature of mind, or of matter either, will start from these as first principles, and will apply himself to observing their qualities and capabilities and laws: and the results will be sound psychology and sound physics.

The converse of the word materialism is immaterialism. This is used only as an abstract term, and even thus very seldom; spiritualism being generally used in its place.

MATERIALS, STRENGTH OF. The strength of any material object, as a rod, bar, beam, chain, or rope, is that power by which the substance resists an effort to destroy the cohesion of its parts. It evidently depends on the disposition of the particles relatively to each other, on the intensity of the force by which the particles cohere together, and on the manner in which the straining power is applied. The inquiry into the laws by which the materials employed in the construction of edifices or machines resist the strains to which they are subject is of considerable importance, because upon a just adaptation of the strength at any one point to the strain there experienced (and an excess or deficiency of the former is nearly equally injurious) depends the stability of the whole.

Whatever be the constitution of a rod or beam, the relation between its strength and the strain to which it may be exposed can be made the subject of mathematical investigation only by imagining the material to consist of an infinite number of particles arranged in lines (like fibres or threads) parallel to each other in the direction of its length. The particles in each line must be supposed to cohere together by powers exerted in that direction; and the several lines to cohere laterally with forces which may, or may not, be equal to those exerted longitudinally. In homogeneous bodies, as glass and some of the metals, the particles may be supposed to be symmetrically disposed throughout the masses, and to attract each other in every direction with equal powers: but the case is different in other bodies, particularly in timber; for in such the lateral cohesions of the fibres are much less powerful than the longitudinal cohesions of the particles in each fibre. In ropes the fibres have no lateral cohesion, and the strength depends on the twisting of the fibres together; in consequence of this, as the latter can scarcely be separated from each other in the direction of the length of the rope, the cohesion of nearly all the particles in any transverse section must be destroyed before a disruption can take place.

A rod of any material, consisting of parallel fibres as above supposed, being placed in a vertical position, and strained by a weight applied at the lower extremity, the particles in every fibre will be separated from each other by the action of the weight, and consequently its length will be increased. The cohesive power by which the particles are kept together will, in most cases, be diminished by the separation; and if the weight be sufficiently great, or if it be allowed to act during a sufficient length of time, the cohesive power will be certainly overcome; that is, the rod will, in some parts of its length, be torn asunder. But before this occurs, since all bodies possess a certain degree of elasticity, on removing the weight the attraction of cohesion will cause the separated particles to return towards their original positions; or the rod will become nearly of the same length as at first. That it does not exactly become so, in general, arises from the imperfect elasticity of the material, on which account the particles come to a state of rest at augmented distances from each other. The elongation of the rod when strained by a weight, and the amount of the weight necessary to produce fracture, will depend on the nature of the material; and, from a want of uniformity in the constitution of materials even of the same kind, though the rods be of like dimensions, great irregularities are found to exist in their power of resisting direct strains. Numerous experiments performed on each of the different kinds of material can alone afford a mean value on which reliance may be placed when it is required to determine the capability of a bar or beam to resist the strain arising from the action of any given force.

If the materials were perfectly elastic, so that the length of the rod became the same, after the removal of the suspended weight, as before that weight was applied, the force of cohesion would evidently be proportional to the intensity of the straining power; and this is generally adopted as an hypothesis in investigations concerning the equilibrium between strengths and strains; it being understood that the latter have only that moderate degree of intensity, compared with the former, which is consistent with the permanent stability of the edifice or machine. The law just mentioned appears to have been discovered by Dr. Hooke; and, as the separation of the particles in any fibre is proportional to the straining power, it follows that, within certain limits, the cohesive power between two particles of an elastic body is proportional to the distances to which one of them is removed by the straining force from the place where it was before at rest. The same law is considered to hold good when the particles of an elastic body are made to approach each other by the action of a compressing force like that of a weight on the top of a vertical pillar.

The power by which the particles in any body resist the action of a force tending to separate those particles in the direction of the length of the body may be considered as constituting the direct or absolute strength; and it is evident that, if the body were of a homogeneous texture, that strength would be proportional to the number of particles in a transverse section; that is, to the area of such section, while the strain is proportional to the weight applied. Therefore, if F designate the cohesive power in a unit of such area, as a square inch, a square foot, &c.; also if A represent the area and W the weight applied, including that of the body itself, we should have $F.A = W$ when the strength and strain are in equilibrio. This formula for the absolute strength may be considered as nearly correct with respect to most of the bodies in nature: and hence (F being determined by experiment) the strength by which a rod of any material resists this kind of strain may be found when the dimensions of the rod are given.

For complete details concerning the experimented values of F, the reader must be referred to the extensive tables which have been published by Barlow (*Essay on the Strength of Timber*); Rennie (*Phil. Trans.* 1818); Tredgold (*Principles of Carpentry*); and Hodgkinson (*Manchester Memoirs*, vol. iv.), our limits permitting us to introduce only the few determinations which follow.

The area of a transverse section of each rod is one square inch, and the values of F are expressed by the breaking weights in pounds avoirdupois.

English oak		F = 8,000 to 12,000
Fir . .		11,000 to 13,488
Beech . .		11,500
Mahogany .		8,000
Teak . . .		15,000
Cast-steel .		134,256
Iron-wire .		93,964
Swedish bar-iron		72,064
Cast-iron .		18,656 to 19,488
Wrought-copper		33,792
Platinum wire .		52,987
Silver do.		38,257
Gold do.		30,888
Zinc do.		22,551
Tin do.		7,129
Lead do.		3,116
Rope (1 inch circumf.) bore	1,000 lb.,	F = 12,566
Whale-line spun by hand (2 in. circumf.) .	2,240 „	7,037
Do. by machinery ($1\frac{3}{4}$ in. circumf.) .	3,520 „	12,582

Rope (3 in. circumf.)	5,628 lbs.,	F =	7,858
Do. (4 in. circumf.)	9,988	"	7,845
Cable (14½ in. circumf.)	89,600	"	5,355
Do. (23 in. circumf.)	255,360	"	6,066

Notwithstanding the irregularities in the column containing the values of F for ropes, it may be concluded that ropes of a given diameter have less strength on each square inch of their transverse section than those of less diameter; and this is owing, no doubt, to their threads being less twisted together. It may be observed also that those woods whose fibres are nearly straight bear much greater weights suspended from them than those whose fibres have considerable curvature.

According to the experiments of Mr. Barlow it appears that a bar of malleable iron is extended one ten-thousandth part of its length by a direct strain equal to one ton for each square inch in the area of the transverse section: when stretched with ten tons per inch its elasticity was injured, or the bar did not return to its original state.

If the fibres in any material body were exactly rectilinear, so that, a rod being placed on one end in a vertical position, no one of the particles were opposite to the intervals between any two in a transverse section below it, it might be conceived that no force compressing the rod in the direction of its length would produce any other effect than that of diminishing its length. But, as we find that all bodies when so compressed may be bent, and finally broken, such a disposition of the particles is destitute of probability. In fact, when a pillar is compressed by a great weight above it, either the fibres, already curved, have their curvature increased, so that the whole pillar bends; or the particles in some of the transverse sections are forced outwards by lateral pressures arising from those above and below their intervals being thrust between them, and then the pillar swells on its whole periphery. The consequence in either case is, that the cohesion of the longitudinal fibres is impaired or destroyed, and the pillar is at length broken or crushed.

The strength of a pillar when so compressed must evidently depend upon the number of particles in a transverse section; that is, upon the area of such section: but since, besides the displacement of those particles from the longitudinal pressure, their lateral cohesion must be overcome before they can be thrust outwards, it is evident that the strength is not proportional to the area, simply, but to some function of that area. No law on which any dependence can be placed has yet been discovered for the strength of a pillar in such circumstances. Euler, from analytical considerations, concluded that it varies as the square of the area; but late engineers have supposed that the square root of the third power of the area more correctly represents the law of the strength.

The following table of the strength by which materials resist this kind of force, when just crushed by the pressure, is extracted from the account of experiments made by Sir John Rennie, but the weights found from the experiments are here reduced, agreeably to the law last mentioned above, to those which might have crushed the materials, if the latter had been formed into prisms having the area of the transverse section equal to one square inch:—

		lbs.
Elm	crushing weight	1,284
White deal	"	1,928
Oak	"	3,860
Chalk	"	334
Red brick	"	538
Portland stone	"	3,047
Limestone	"	5,903
Aberdeen granite	"	7,276
Cast-iron	"	681,376

If a bar or pillar, resting on one end in a vertical position, and considered as a perfectly elastic body, be compressed by a weight acting vertically above it, the purely mathematical theory gives the following equation for the value of the compressing weight when the pillar begins to bend:—

$$W = \frac{\pi^2 ad^2}{12l^2}\delta$$ (Poisson, *Mécanique*, tom. i., No. 313);

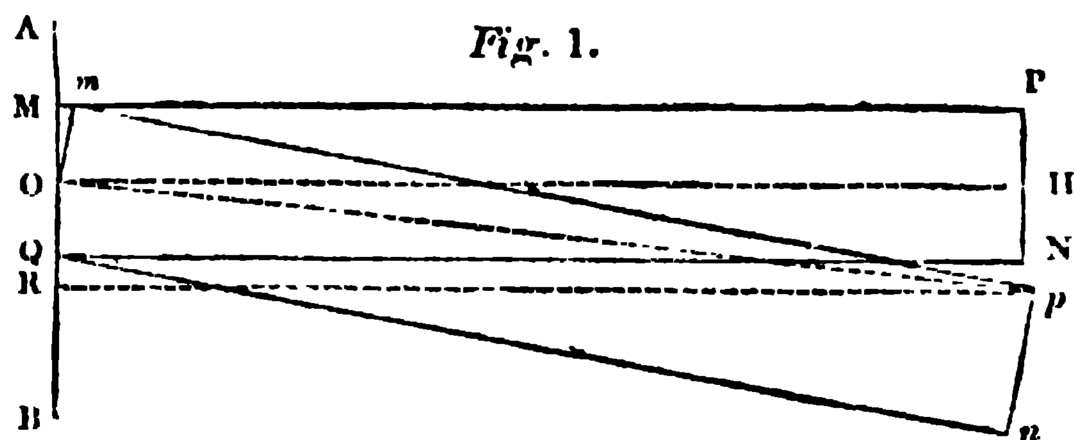
where W = the compressing weight; l = the length of the pillar; a = the area of the transverse section; d = the thickness perpendicularly to the bending surface; δ = the element of deflection; and $\pi = 3{\cdot}1416$. It follows that, when in two bars of like material a and d are respectively equal, the weights which those bars will sustain without bending are inversely proportional to the squares of the lengths.

It is also found, if w be a weight applied as above, and producing a flexure p, measured at the middle of the bar perpendicularly to its length, that $\delta = \frac{4wl^2}{ad^2p}$: this being substituted in the expression for W, the latter becomes

$$W = \frac{\pi wl}{3p}.$$ (*Ibid.*, No. 314.)

The most important inquiry concerning the strength of materials is that which relates to a beam or bar supported at its extremities on two props, and strained transversely by a weight acting perpendicularly to its length at a given point between the props.

In order to simplify the investigation, it is usual to imagine that the beam, its breadth and depth being supposed uniform, is made to rest on one prop at the place where the weight may have been applied in the former case, suppose in the middle of its length, and that from the points where the two props were situated weights are suspended equal to the reactions of those props in consequence of the first weight; that is, to half the whole weight in the middle. Then, supposing the deflection of the beam to be very small, so that, in the former case, the beam did not slide on its points of support, the effect of the two weights to break the beam on its single prop will be the same as that of the one weight applied as at first supposed. Again, if a beam of equal dimensions with respect to breadth and depth were fixed at one end horizontally in a wall, the part projecting from the face of the wall being equal in length to half that of the former beam; and if a weight were applied at the opposite end equal to each of the two weights applied to the beam on one prop, the effect of this weight to break the beam at the face of the wall will be equal to that of the two weights to break the beam on the one prop, or of the double weight to break the same beam on two props. The investigation for the case at first supposed is therefore reduced to that of finding the strength of a beam attached at one end to a wall, and strained by a weight at the opposite extremity.



Let A B (*fig.* 1) be the face of a wall, and let M N represent a vertical section of the beam in the direction of its length. Let it be supposed that the beam consists of an infinite number of fibres parallel to M P; then, if these fibres were supposed to be rigid and incompressible, the effect of a weight at P would be to bring the beam to an inclined position, as $m\,n$, producing a fracture on the line M Q by drawing the particles on that line away from those which were at first nearly in contact with them. But from experiment it is found that, when a beam is so strained, while the upper fibres are in a state of tension, the lower ones are in a state of compression; and consequently that there is a certain point O in the depth of the beam at which neither of these effects takes place. A line passing through this point perpendicularly to the plane M N is therefore called the neutral axis of the beam, and the termination of the fracture may be supposed to be at O instead of Q; the fibres below the former point having no effect in resisting the tendency of those above to be broken, yet constituting part of the strength of the beam by the power with which they resist compression, and thus oppose the tendency of the beam to turn about the neutral axis. The position of this neutral axis is uncertain; but Mr. Barlow, from experiment, has found that in rectangular beams of wood (the faces being in vertical and horizontal positions) its distance from the upper surface at M bears to the whole depth M Q the ratio of 1 to $1+\sqrt{3}$, or nearly that of 4 to 11. Therefore, d representing the depth M Q, let O M be represented by $\frac{4}{11}d$.

Now adopting the hypothesis of Leibnitz, which is founded

on the elasticity of the fibres, that the force of cohesion in any one fibre is proportional to the tension to which it is subject, or to the distance of that fibre from the axis about which the beam turns in consequence of the strain; that is, from the neutral axis just mentioned: if x be the distance of any fibre above O from the latter place, and f represent the force of cohesion in the fibre at M P, we shall have $\frac{4}{11}d : f :: x : f\frac{11}{4d}x$: and the last term will express the force of cohesion between two particles at a distance above O equal to x. Consequently, dx expressing the indefinitely small depth of a fibre, we have $f\frac{11}{4d}x\,dx$ for the cohesive power of a fibre at the same place. But this power acting at a distance from O equal to x, we have $f\frac{11}{4d}x^2\,dx$ for the momentum of that force, and its integral will express the strength of all the fibres in the vertical section represented by M N. The transverse section of the beam being supposed to be rectangular, the breadth will be constant; let it be represented by b: then the integral of $f\frac{11b}{4d}x^2\,dx$ (between $x=0$, $x=\frac{4}{11}d$), that is $\frac{16b}{363d}fd^3$, or nearly $\frac{1}{23}bd^2f$, will express the strength by which all the fibres above the axis at O resist the strain.

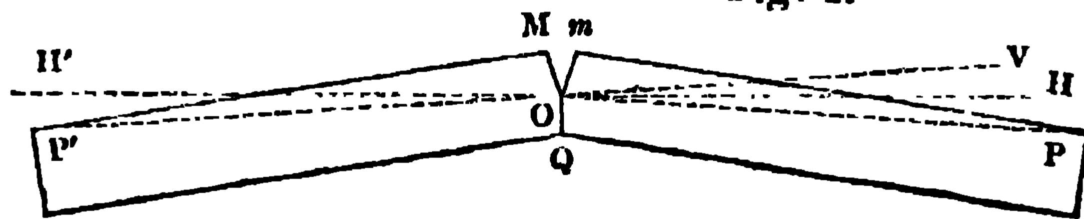
A corresponding expression for the strength arising from the resistance of the fibres below the neutral axis to the force of compression would be the integral of $f'\frac{11b}{7d}x^2\,dx$ (between $x=0$, $x=\frac{7}{11}d$), that is, nearly $\frac{2}{15}bd^2f'$ (f' being the force by which a fibre at Q N would resist compression), and the sum of the two integrals will be the whole strength of the beam to resist a transverse strain. Now the ratio of f to f' is different in different materials; and if we take $f'=\frac{1}{2}f$ (which is the case in some kinds of wood), the said sum will be $=\frac{1}{9}fbd^2$ nearly.

But when the beam is strained by a weight W applied at P, so that it take the inclined position $m\,n$, if we join O and p, and let fall the perpendicular pR on A B, we shall have W.pR, or (if l be the length of the beam) W.l cos OpR, for the momentum of the weight. Then $W.l\cos Op\mathrm{R}=\frac{1}{9}fbd^2$ becomes the equation of equilibrium, W representing the weight which will just break the beam; and when $\angle$OpR, or the deflection, is small, its cosine may be considered as equal to unity. It follows that the strength by which beams of the like material resist this kind of strain will vary as $\frac{bd^2}{l}$.

If a perfectly elastic beam or bar were attached horizontally at one end to a wall, and were strained by a weight W at the other end, the mathematical theory would give for the deflection of the opposite end of the beam (that is, the distance to which this end would be drawn in a vertical direction from the original position of the beam) $\Delta=\frac{W.l}{ad^2\delta}$ (Poisson, *Mécanique*, tom. i., No. 310), where $\Delta=$ that deflection; $l=$ the length of the beam; $a=$ the area of the transverse section; $d=$ the depth; and $\delta=$ the element of deflection. Therefore, if Δ be found from experiment on a beam or bar in which W, l, a, d, are given, we may from this equation obtain δ; and subsequently the value of Δ may be found for any beam, the materials being of the same kind. Again, the straining power by which a beam fixed at one end to a wall is dilated in the direction of its length is expressed by $a\,\delta$ D (*Ib.*, No. 308), where D is the element of dilatation. Now, if w be the weight which would produce the deflection δ and dilatation D, we should have $w=a\,\delta\,\mathrm{D}$; whence $\frac{\mathrm{D}}{w}=\frac{1}{a\,\delta}$; and the first member of this equation being substituted for its equivalent in the above expression for Δ, the latter becomes $\Delta=\frac{\mathrm{D.W.}l^3}{wd^2}$; or since the elongation of the whole beam is proportional to the length, and may be represented by D.l, if we put E for this elongation when $w=\mathrm{W}$, we shall have $\Delta=\mathrm{E}\frac{l^2}{d^2}$. Whence the elongation of an elastic rod by a weight or power acting in the direction of its length is to the deflection of the same rod by a weight or power acting perpendicularly to its length, as the square of the depth or thickness is to the square of the length.

The relations between the strength and strain when a beam or bar, as M N in the preceding figure, is fixed at one end in a wall, and when a beam, as P′M P in the annexed diagram (*fig.* 2), of equal dimensions with respect to breadth

Fig. 2.



and depth, but twice as long, is supported on a prop at its middle point (the weight at each extremity of the latter being equal to that at the extremity of the former), are the same. Also the angle V O P of deflection (O V being in the direction of P′O produced), when a beam is supported on a prop at Q, is equal to $\angle$OpR, or $\angle$H Op, in the preceding figure (O H being drawn perpendicular to the wall, or parallel to the horizon, and the beam M N being equal in every respect to one of the half-beams on the prop). For the angles M O m are equal in both cases; since the weight at P′ produces only the same effect as the reaction of the wall: and hence it follows that the angle H O P of deflection, with respect to the horizontal line H′H, will be equal to only half the angle H O p. The same relation subsists between the deflections when the beam P′M P is supported on the props at the extremities.

It will follow, from what was at first stated, that a beam attached at one end to a wall in a horizontal position will bear suspended from the other extremity only half the weight which the same beam will bear on its middle point when made to rest loosely on the two props. If the ends of the beam were prevented from rising on the props, the strength would, on account of the additional weight necessary to produce deflection or fracture at each end, be increased in the ratio of 3 to 2 nearly.

The following table contains a few of the results obtained from experiments made by Messrs. Banks, Barlow, and Tredgold, on wood and iron, when supported loosely on props and subject to a transverse strain at the middle point. The second column contains the length of the beam or bar in feet; the third, the areas of the transverse sections in square inches; the fourth, the breaking weights in pounds; and the last, the deflections at the middle points in inches.

	l	a	W	Δ
Young oak (English)	2	1	482	1·87
Ship timber .	2½	1	264	1·5
Oak (English) .	7	4	637	8·1
New England fir	7	4	420	4·66
Riga fir . .	2½	1	212	1·3
Teak . . .	7	4	820	4·
Cast-iron bars .	3	1	756	
Ditto . .	3	1	869	

Since the strengths of beams attached at one end or supported on props, the other dimensions being the same, vary as the squares of the vertical depths, it follows that the most advantageous position, when the areas of the transverse sections are equal, is that in which the broadest surface is in a vertical position. In this manner girders and joists in edifices are invariably placed.

When a beam or bar is attached at one end to a wall, or when it turns upon its middle point like the great lever of a steam-engine, if it be required that the beam should be equally strong in its whole length, it should be made to taper towards its extremities. When the depth of the beam is constant, the breadth at any point should be proportional to its distance from the extremity. When the breadth is to be constant, the vertical face of the beam should have the form of the common parabola; and when both breadth and depth vary, a longitudinal section of the beam should have the figure of that which is called a cubical parabola.

If a weight be applied at any point in the length of a beam which is supported on two props, the strain produced by it will be the greatest when it is placed in the middle; and the strain varies as the product of the distances of the weight

from the points of support. For let A B (*fig.* 3) represent

Fig. 3.

A P C P′ B

a beam supported at A and B, and let C be any point in it. Imagine a weight W to be applied at any point P; then, by the nature of the lever, A B : P B : : W : the pressure exerted by W on the point A, viz. $\frac{\text{W.PB}}{\text{AB}}$; and this term expresses the reaction of the prop at A in consequence of the weight at P. Then also $\frac{\text{W.PB}}{\text{AB}}$ A C is equal to the strain at C produced by this reaction. Again, imagine a weight W′ to be applied at P′; then we shall have, as before, AB : P′A : : W′ : $\frac{\text{W}'.\text{P}'\text{A}}{\text{AB}}$, and this last term expresses the reaction of the prop at B in consequence of the weight at P′: also $\frac{\text{W}'.\text{P}'\text{A}}{\text{AB}}$ B C is equal to the strain at C produced by this reaction. The sum of these strains is equal to the whole strain at C produced by the two weights. But when P and P′ coincide with C, we have P′ A = A C, P B = B C; and the sum of the two strains is $\frac{\text{W. BC. AC}}{\text{AB}} + \frac{\text{W}'.\text{AC.BC}}{\text{AB}}$; or, putting W″ for W + W′, we have the strain at C, in consequence of the weight W″ placed there, equal to W″. $\frac{\text{AC. BC}}{\text{AB}}$; and if W″ be a constant weight applied at any point in A B, the strain will vary as A C, B C. This rectangle, and consequently the strain, is a maximum when C is in the middle of the line.

If a weight be diffused over a beam which is fixed at one end to a wall, it may be considered as acting at its centre of gravity, which, if the diffusion be uniform, will be in the middle of the length of the beam. The momentum of the strain will consequently be equal to half of that which would result from an equal weight attached to the opposite end.

When a body is compressed in a direction perpendicular to the length of the fibres, the points of support being very near and on opposite sides of the place at which the force is applied, the strain to which the body is then subject has been called by Dr. Young the force of detrusion. This species of strain sometimes occurs in the construction of machinery; but few experiments have yet been made to determine the strength by which materials resist it. From these however it appears that the strength is proportional to the area of the transverse section, and that it varies from four-thirds to twice the strength by which the same material would resist a strain in the direction of its length.

Such machines as capstans and windlasses, also axles which revolve with their wheels, are, when in action, subject to be twisted, so that their fibres tend to become curved in oblique directions; and the strain thus produced is called that of torsion. The most natural way of investigating the strength of materials to resist this kind of strain is probably that which was adopted by Dr. Robison: this mechanician imagined the cylindrical body to be composed of an infinite number of concentric hollow cylinders inserted in each other; and, supposing the whole to be cut by a plane perpendicular to the axis, he conceived that two particles in the circumference of any one of the concentric circles would resist the effort to separate them, by a force proportional to their distance from the common axis. Hence, if the radius of the whole cylinder be r, and that of any one of the internal cylinders be x; also, if F′ represent the force of cohesion between any two particles in the outer circumference, we have $r : \text{F}' : : x : \frac{\text{F}'}{r} x$. The last term expresses the like force in the circumference of the cylinder, whose radius is x, and the momentum of cohesion is $\frac{\text{F}'}{r} x^2$. But as all the particles in that circumference exert the same power, and the number of particles is proportional to x, it follows that $\frac{\text{F}'}{r} x^3$ will represent the sum of all the forces in the latter circumference, and $\frac{\text{F}'}{r} x^3\, dx$ will represent the sum in a hollow cylinder whose thickness, in the direction of the radius, is infinitely small and equal to dx. Then, by the rules of integration, we have for the strength of the whole cylinder the expression $\frac{\text{F}'}{4\,r} x^4$, which, between $x = 0$ and $x = r$, becomes $\frac{\text{F}'}{4} r^3$; and hence the whole strength of any cylinder varies as the cube of the radius.

But the area of any section of a cylinder whose radius is r being $= r^2 \pi$ (π being the half circumference of a circle when the radius = 1), it is evident that $\text{F}' r^2 \pi$ will represent the lateral cohesion by which all the particles resist being separated by the force of detrusion. Therefore the ratio between the force of detrusion and that of torsion will be as

$r^2 \pi$ to r^3 or as 4π to r.

And since the strength under the latter strain depends on the radius, it is evident that a hollow cylinder must be stronger than a solid one; the areas of the material in the transverse sections being equal to each other.

MATHEMATICS (*μάθησις*, or *μάθημα*), a name given in the first instance to a branch of knowledge, not as descriptive of its subject-matter, but of the methods and consequences of learning it. The word *μάθησις*, and the Latin *disciplina*, by which it has been rendered, have been the origin of the vernacular terms *mathematics* and *discipline*, the meanings of which have long since separated. The properties of space and number, the subject-matters of the *μάθησις*, have usurped the name; so that anything which relates to them, however learnt, is called mathematics: the Latin word, on the contrary, still retains the signification of a corrective process; and, in speaking of any branch of knowledge, is applied when power of mind is derived from the methods of learning it, as well as knowledge from the results.

The original use of the word mathematics cannot be gathered, as far as we can find, from any express contemporary authority; a few passages, in which the term is used without explanation, as one of notoriety, being all that can be cited, and mostly from Plato. Later writers, as for instance Anatolius (cited by Heilbronner), A.D. 270, give the derivation above alluded to. But before the time of the last-named writer the meaning of the word had been extended: thus the book of Sextus Empiricus 'against the mathematicians' is, as Vossius remarks, directed as much against grammarians and musicians as against arithmeticians and geometers. And John Tzetzes, in the twelfth century, includes under the *μαθήματα* nearly what the universities afterwards called by the name of arts; calling grammar, rhetoric, and philosophy, the disciplines (*μαθήματα*), and arithmetic, music, geometry, and astronomy, arts (*τεχνάι*), included under philosophy.

The distinction between the old and new meaning of mathematics is most requisite to be kept in mind, because arguments are frequently urged for and against mathematics, in which the discipline is confounded with the communication of facts and processes about space and number; and because it is our intention in the present article, confining ourselves to the most important view of the science, as well as to the etymological meaning of its name, to offer a few remarks on the *discipline* called mathematics.

In the time of Plato, which was probably that of the application of words which imply '*the* discipline' to that one exercise of mind which consists in making deductions by pure reasoning from the self-evident properties of space and number, it is probable that such restriction of the word was easily justifiable. At present we have, besides mathematics, physics, the study of antiquity, grammar, &c., which have all been made disciplines, but no one of which was then entitled to that appellation. Nevertheless it has happened that writers, misled partly by the name of mathematics and partly by the pre-eminence of mathematical reasoning in strictness and connexion, have spoken as if it were the *only* cultivator of the pure reasoning power.

Much discussion has arisen upon the question whether those primary propositions which, from our clear apprehension and willing admission of them, are called self-evident, are notions inherent in the mind, or deductions of early experience. Except to mention this controversy, we have here nothing to do with it. The certainty of these propositions is all that we want, and this is conceded by both sides. The consideration however of the fundamental supports of ma-

thematical reasoning is useful and interesting, and, as a safeguard, even necessary. It is not long since a school of metaphysicians existed, who imagined that because all mathematical definitions are precise, therefore the exact sciences are founded upon definition. It was not to them a necessary result of the constitution of our faculties that the three angles of every triangle make up the same amount, but a consequence of definition, which might have been something else, upon different suppositions. We can hardly undertake to explain what we do not understand, but we recommend every beginner in the subject to seek no knowledge about the character of fundamental propositions until he shall have become well acquainted with their consequences. He must take care to admit nothing which is not, or cannot be made, most evidently true; and he will find that all axioms, as they are called, have the highest sort of certainty, namely, that they cannot be imagined otherwise.

Whatever may be the metaphysical hypothesis to which it is referred, it is certain that there is a real distinction between a mathematical assertion and one of any other kind. If we say that an unsupported bit of lead will fall to the ground, we state a fact of which we are as certain, in the sense of reliance, as we are of the other proposition that two straight lines cannot enclose a space. But in the former proposition, an exception, or even a permanent alteration of the law, is conceivable by the imagination: in the latter the mind would feel sensible of absurdity if it attempted to construct the idea of an enclosure bounded by only two straight lines. No distinctive phrases can be too strong to express the essential difference of these two assertions; but it is a misfortune that all terms which create a sufficient distinction are linked to one or another theory of the human mind. If the mathematical student can receive these terms as indicative of the difference of species, without bending before an hypothesis about the conformation of his own reason, he will do well to adopt them; if, on the other hand, he feel compelled to agree with any one system of mental philosophy, he will neither impede nor advance his mathematical career.

The sciences of which we speak may be considered either as disciplines of the mind, or as instruments in the investigation of nature and the advancement of the arts. In the former point of view their object is to strengthen the power of logical deduction by frequent examples; to give a view of the difference between reasoning on probable premises and on certain ones, by the construction of a body of results which in no case involve any of the uncertainty arising from the previous introduction of that which may be false; to form the habit of applying the attention closely to difficulties which can only be conquered by thought, and over which the victory is certain if the right means be used; to establish confidence in abstract reasoning by the exhibition of processes whose results may be verified in many different ways; to help in enabling the student to acquire correct notions and habits of generalisation; to give caution in receiving that which at first sight appears good reasoning; to instil a correct estimate of the powers of the mind, by pointing out the enormous extent of the consequences which may be developed out of a few of its most inherent notions, and its utter incapacity to imagine, much less to attain, the boundary of knowledge; to methodise the invention of the means of expressing thought, and to make apparent the advantages of system and analogy in the formation of language and symbols; to sharpen the power of investigation, and the faculty of suggesting new combinations of the resources of thought; to enable the historical student to look at men of different races, opinions, and habits, in those parts of their minds where it might be supposed *à priori* that all would most nearly agree; and to give the luxury of pursuing a study in which self-interest cannot lay down premises nor deduce conclusions.

As instruments in the investigation of nature and the advancement of the arts, it is the object of the mathematical sciences to give correct habits of judgment and ready means of expression in matters involving degree and magnitude of all kinds; to teach the method of combining phenomena, and ascending from the complicated forms of manifestation to the simple law which regulates them; to trace the necessary consequences of any law, assumed on suspicion, in order to compare those consequences with phenomena; to construct hypothetical representations of laws, or approximations to laws, which shall sufficiently represent phenomena; to convert processes of known accuracy, but complicated operation, into others which make up in simplicity for a certain amount of inaccuracy, and to devise means for judging of that amount of inaccuracy, and confining it within given limits; to ascertain the most probable result of observations or experiments which are discordant with each other either from errors of measurement or unknown causes of disturbance; to point out the species of experiments which should be made to obtain a particular sort of information, or to decide between two laws which existing phenomena both indicate as of nearly equal credibility; to make all those investigations, which are necessary for the calculation of results to be used in practice, as in nautical astronomy, application of force and machinery, and conduct of money transactions; in a word, though that word by itself would have not presented a sufficiently precise idea, to find out truth in every matter in which nature is to be investigated, or her powers and those of the mind to be applied to the physical progress of the human race, or their advancement in the knowledge of the material creation.

The main branches of mathematical science were formerly stated to be arithmetic and geometry, springing out of the simple notions of number and space. This is too limited a description. Unquestionably the science of numbers, strictly and demonstratively treated, and that of geometry, or the deduction of the elementary properties of figure from definitions which are entirely exclusive of numerical considerations, must be considered as the elementary foundations, but not as the ultimate divisions, of mathematics. To them we must add the science of operation, or algebra in its widest sense,—the method of deducing from symbols which imply operations on magnitude, and which are to be used in a given manner, the consequences of the fundamental definitions. The leading idea of this science is operation or process, just as number is that of arithmetic, and space and figure of geometry: it is of a more abstract and refined character than the latter two, only because it does not immediately address itself to notions which are formed in the common routine of life. It is the most exact of the exact sciences, according to the idea of their exactness which is frequently entertained, being more nearly based upon definition than either arithmetic or geometry. It is true that the definitions must be such as to present results which admit of application to number, space, force, time, &c., or the science, would be useless in mathematics, commonly so called; but it is not the less true that a system of methods of operation, based upon general definitions, and conducted by strict logic, may be made to apply either to arithmetic or geometry, according to the manner in which the generalities of the definition are afterwards made specific.

The common division however of the mathematical sciences will not admit of the threefold separation just described, the science of operation being more or less mixed up with arithmetic in common algebra, and in its application to geometry. We may describe this division as follows:—

1. *Pure Arithmetic*, subdivided into *particular* and *universal*:* the former, the common science of numbers (integral and fractional) and calculation; the latter, the science of numbers with general symbols, or the introduction to algebraical methods, restricted to purely numerical processes. The science which treats of the peculiar relations of numbers, and subdivides them into classes possessing distinct properties, is called the *theory of numbers*, and is an extension which frequently requires a higher algebra.

2. *Pure Geometry*, which investigates the properties of figures in the manner of Euclid, that is, with restrictions which confine the student to the straight line and circle as the means of operation and the boundaries of figure. [GEOMETRY, p. 153.] This science includes solid geometry, as far as figures bounded by planes, the properties of the sphere, cone, and cylinder, and of their plane sections; but it does not allow any conic section, except the straight line and circle, to be employed in the solution of problems.

3. *Algebra*, including the general calculus of operations (though this is not an elementary branch), and all methods which can be established without the aid of processes exclusively belonging to the differential calculus. The distinction between it and universal arithmetic is an extended use of operations, preceded by an extended definition of their meaning.

* We have supplied the word particular, as opposed to universal; algebra was sometimes called universal arithmetic, but the phrase never became general, owing to its being obvious to those who studied algebra, that arithmetic, however general its symbols may be, is only a part of algebra.

4. *Application of Algebra to Geometry.*—This includes *trigonometry*, and all those parts of geometry in which problems are numerically solved, and the method of Euclid is abandoned. Thus it includes the conic sections as commonly taught; and in its higher parts is an application of the differential calculus, as well as of algebra.

5. *Differential and Integral Calculus.*—Under this term we include the general theory of limits, that is, all digested methods of operation, in which the limits of ratios are used as algebraical quantities under specific symbols. This distinction is necessary, since the notion of a limit, and even propositions which belong to the differential calculus in everything but form, are contained in the elements of Euclid, and the application of arithmetic to geometry. The *calculus of differences* and the *calculus of variations* are usually placed under this head: the former, in its elementary parts, might be referred to common algebra; the latter is an extension of the differential calculus.

The division of the mathematical sciences into *pure* and *mixed* is convenient in some respects, though liable to lead to mistake. By the former term is understood arithmetic, geometry, and all the preceding list; by the latter, their application to the sciences which have matter for their subject, to mechanics, optics, &c. But considering that in all these subjects a few simple principles are the groundwork of the whole deduction, they might be explained as intended to answer two distinct questions: first, what are the consequences of such and such assumptions upon the constitution of matter? secondly, are these consequences found to be true of matter as it exists, and are the assumptions therefore to be also regarded as true? In the reply to the first question, the science is wholly mathematical; to the second, wholly experimental in its processes, and inductive in its reasonings; and this is the *mixture* from which the joint answer to both questions derives its name, and not from any difference between its mathematics and those of the pure sciences. Again, a science does not take the name of mixed mathematics simply because it is possible to apply mathematical aid in the furtherance of its legitimate conclusions: such a use of terms would be trifling with distinctions, since it would bring political economy, chemistry, geology, and almost every part of natural knowledge, under the same head as mechanics and hydrostatics. The words in question should be reserved to denote those branches of inquiry in which few and simple axioms are mathematically shown to be sufficient for the deduction, if not of all phenomena, at least of all which are most prominent. Taking the leading ideas of the mixed sciences instead of their technical names, we may describe them as relating to motion, pressure, resistance, light, heat, sound, electricity, and magnetism. As disciplines, it is their main object to teach the true method of inquiry into the laws, and, so far as can be known, the causes, of material phenomena; as instruments, it is not necessary to say one word about them. Two only have not been mentioned: the first, astronomy, which belongs to more than one of the preceding; the second, the theory of probabilities, of which, though placed among the mixed sciences, it may be doubted whether its proper place is not in the first list.

The most important question connected with the mathematical sciences is the manner in which they should be taught as disciplines of the mind. This concerns all who consider any branch of knowledge in that light; and, as education spreads, this view of the subject will become of more and more consequence. Vitally essential as these sciences are to the advancement of the arts of life, we feel, in regard to this branch of their utility, in the situation of those who know that they must and will be attended to, because their cultivation is necessary to the supply of wants which all can feel, and the promotion of interests which all can understand. It is not so with the first-mentioned object of their study, but rather the reverse; for the wants of life being as easily supplied by the results of an illogical as of a logical system (provided only that vicious reasoning be not allowed to produce absolute falsehood), the facilities which laxity of reasoning affords in the mere attainment of results will always recommend it to those whose main object it is to apply the fruits of calculation to the uses of life. Such has been, and, we are afraid, will continue to be, the tendency of the great advance which the last century made in application.

All we should positively contend for is the necessity of making the entrance to the study as strict and rigorous as reason can make it, to all who are to receive liberal education. In the higher branches of mathematics many opinions prevail, and it would be impossible to make a formal standard of rigour. Add to this, that with a certain degree of experience in the estimation of reasoning, it may be comparatively immaterial which of several different methods is adopted; either may be rigorous if properly understood, and if the habit of reducing looseness of phraseology, or dangerous abbreviation of logic, to strict definition and formal deduction, shall first have been well formed. To assist in gaining this end, we should propose—

First, that no student should be allowed to enter upon the use of language in mathematical reasoning until he has acquired more acquaintance with the nature of assertion, denial, and deduction, than can be obtained from previous education as now given: this to be done by the study of the elements of logic.

Secondly, that no consideration of facility or practical convenience should prevent the first study of arithmetic and geometry from being strictly demonstrative, and formally rigorous: rigour being defined to consist in explicit statement of every assumption, and logical treatment of every inference.

On the first of the preceding recommendations we shall only observe, that in order to distinguish between accurate and inaccurate inference, an acquaintance with the exact extent of meaning of the several modes of communication is absolutely necessary. This cannot be learnt from the ordinary use of language, which abounds in implications to be suggested by the circumstances of the speaker, the context of the words, or the tone in which they are delivered. Before the phrases of demonstration can be made to convey a meaning limited in both directions, the strict use of language must be made a study; if this be neglected, the words of any book may pass between the teacher and the learner, but no precaution has been taken to secure their conveying the proper meaning, neither too much nor too little.

On the second recommendation, we must first explain that we hold many points of controversy very cheap, as far as they concern the discipline given by the most elementary branches of mathematics. It matters nothing, in our view of the case, whether an axiom be really incapable of proof, or whether the substitution of another would or would not place the science on a more simple basis. The habit to be formed is that of tracing necessary consequences from given premises by elementary logical steps: the premises to be true or false, the consequences to be true if the premises be true, and dubious (not necessarily false) if the premises be false. The only error which, at the stage in question, it is intended to avoid, is the deduction, as a necessary consequence, of that which is not so. The mind of the learner however is allowed to dwell too much at the outset on the absolute truth or falsehood of the conclusions, to the neglect of their connection with the premises: hence it arises that when a process occurs in which it is essential to examine that connection for its own sake, it is the universal complaint that beginners find difficulty and obscurity. From what other cause arises the dislike of the indirect demonstration? [ABSURDUM, REDUCTIO AD.]

Unfortunately for the mental progress of the student, he is often allowed to use premises of an easy form, in cases where a complete preparation for the subject would require more extended first principles and greater prolixity of deduction. To this, as before observed, no objection can be taken in itself, provided that no consequences be admitted except the legitimate ones. But something more *is* admitted: the pupil is presented, in consideration of his attention to one set of premises, with the consequences of another, and is allowed to make believe that he has come fairly by the latter. Thus, by a theory which applies only to the ratio of number to number, he is permitted to draw general conclusions upon all ratios. When, in opposition, we advise that the first studies should be demonstrative and rigorous, we do not imply, for instance, that the more difficult system should in all cases be preferred to the less complete but more simple: we confine ourselves to insisting that whatever the premises may be, the conclusions should really follow; and that if the latter be necessarily of a limited character, the limitation should be stated.

The work of Euclid is preferable, in our opinion, to any system which has been proposed to supply its place; simply because the dependence of conclusions upon premises is more distinct than in any other geometrical writing. The

defects with which it abounds are trifles which can be remedied as they are met with; and though there are seldom three propositions together, one or other of which will not call for some remark from the teacher, yet such is Euclid, that these very faults, properly noted, are of more value than the greater elegance and more artificial process of less formally rigorous writers. Of the part relating to PROPORTION we shall treat under that word.

The necessity of a demonstrative system of arithmetic is practically denied, in this country at least, by the use of a set of dogmatical rules. Such training would be less prejudicial if the notions of the student on reasoning were more settled, so that he could receive these rules with some fitting idea of their purpose, and of the extent to which they are to be considered as knowledge. As it is, he has no other view of arithmetic presented to him, and his conceptions of number are allowed to be first fettered, and afterwards led astray, by ideas derived sometimes from the reception of the conventional for the necessary, sometimes from modifications of truth which are convenient in practice though unsound in theory. Such an addition to his stock of mathematical power predisposes him to acquiesce in the shifts by which rigour is avoided in other parts of the science; and an arithmetic from which both sequence and accuracy of thought have been excluded is the asylum of geometry against truth, when the latter becomes too difficult for an unenergetic, that is untrained, power of investigation.

We shall conclude this article with some references to works on the history of mathematics, a subject so connected with that of the other sciences, that it would be impossible to say anything on it in few words. The great work of Montucla, continued (from his papers partly) by Lalande, 'Histoire des Mathématiques,' 4 vols., Paris, 1799-1802, is the most accessible source of information for the reader who desires some detail. The bibliography of Murhard, 'Litteratur der Mathematischen Wissenschaften,' Leipzig, 1797, will be found a useful accompaniment in the verification of dates. The work of Kästner, 'Geschichte der Mathematik,' Göttingen, 1796, is more precise in its account of individual labours than that of Montucla, but does not embrace so large a field. The works of Bossut, namely, the preface to the mathematical part of the 'Encyclopédie Méthodique' and the 'Histoire des Mathématiques,' 2 vols. 8vo., Paris, 1810, are written in an interesting manner; and the latter (which was translated by Bonnycastle) brings some parts of the history later than its predecessors. Cossali's 'Origine dell' Algebra,' 2 vols. 4to., Parma, 1799, is an account of the early Italian algebra: its successor in the same subject, 'Histoire des Sciences Mathématiques en Italie,' Paris, 1838, by M. Libri (of which two volumes only have appeared, four more being understood as intended), bids fair to be very valuable from the number and extent of the citations. Much on the subjects of algebra, logarithms, and trigonometrical tables may be found in Dr. Hutton's Tracts (3 vols. 8vo., 1812), and in the preface of his Logarithms. The work of Montucla, 'Récherches sur la Quadrature du Cercle,' reprinted with additions in 1831, is complete on the subject of which it treats. There is a work on a kindred subject which we have never seen, Reimer, 'Historia Problematis de Cubi Duplicatione,' Göttingen, 1798. Delambre's 'Rapport Historique sur les Progrès des Mathématiques depuis 1789,' Paris, 1810, is the least specific of his historical works, but, points of nationality apart, is accurate. Professor Peacock's article on arithmetic in the 'Encyclopædia Metropolitana,' and his report on Analysis, in the second volume of the 'Transactions of the British Association,' are full of historical information of the most precise character. Some notices of early English mathematicians, enough to guide the reader to sources of information, are contained in the 'Companion to the Almanac' for 1837, and in the 'Magazine of popular Science,' Nos. 18, 20, and 22. The eleventh volume of the 'Memoirs of the Academy of Brussels' contains the 'Aperçu Historique,' &c. of M. Chasles, a history of geometry and a complete account of its modern progress.

Among works of older date, which are often cited, we may notice Ward's 'Lives of the Gresham Professors,' London, 1760; Heilbronner's 'Historia Matheseos Universæ,' Leipzig, 1742, does not deserve that title, but contains an immense quantity of information on the antient part; G. J. Vossius, 'De quatuor Artibus popularibus,' Amsterdam, 1650, contains a large number of dates and short biographical accounts; to Blancanus, 'De Mathematicarum Naturâ Dissertatio,' Bologna, 1615, is appended a chronological list of mathematicians up to the time of Galileo; the 'Scolæ Mathematicæ' of Peter Ramus, Frankfort, 1627, contains many historical notices. The number of writings which might be referred to as incidentally affording information is of course numerous.

MATHEWS, CHARLES, an eminent comedian, was born on the 28th of June, 1776, and educated at Merchant Tailors' School. His father, Mr. James Mathews, was a bookseller in the Strand, and intended Charles, who was his seventh son, to follow the business. A strong and early inclination for the stage however induced the son, after two or three attempts in private, to make his début as an amateur in the parts of Richmond in 'Richard III.,' and Bowkit in 'The Son-in-Law,' at the Richmond theatre, Saturday, Sept. 7, 1793; and on the 19th of June, 1794, he made his first appearance as a regular comedian at the Theatre-royal, Dublin, for the benefit of Mrs. Wells, and in the characters of Jacob in 'The Chapter of Accidents,' and Lingo in 'The Agreeable Surprise.' In 1797 Mr. Mathews married his first wife, Miss Eliza Kirkham Strong, the daughter of a physician at Exeter. She died at York in 1802; and in 1803 Mr. Mathews was united to his second and surviving wife, Miss Anne Jackson, at that time a member with himself of the York company. On the 15th of May in the same year Mr. Mathews made his first bow to a London audience at the Haymarket theatre, and on the 17th of September, 1804, his first appearance at Drury-Lane, in the character of Don Manuel, in 'She would and she would not.' On Wednesday, April 12, 1808, at the Theatre-royal, Hull, he made his first trial of those popular performances, his 'Entertainments' and 'At Homes,' by the recital of his 'Mail-Coach Adventures, or Rambles in Yorkshire.' On the 22nd of July, 1814, Mr. Mathews was severely injured by being thrown out of a tilbury in which he was driving his friend Mr. Terry. The effects of this unfortunate accident he felt to the last day of his life. On the 2nd of April, 1818, he commenced his extraordinary engagement with Mr. Arnold of the English Opera House, and gave his first 'At Home' in London, an entertainment which he repeated thirty-nine nights to overflowing houses. In 1822 he paid his first visit to New York, returned to England in the following year, and in 1824 produced his entertainment entitled 'A Trip to America.' In January, 1828, he accepted a short engagement at Drury-Lane, and in the autumn of the same year became joint proprietor with Mr. Yates of the Adelphi theatre, by the purchase of his deceased friend Mr. Terry's share. In 1834 he again visited America, but was compelled by ill health to return prematurely, having played only thirty nights. On Tuesday, 28th of June, 1835 (his birth-day), he expired at Plymouth, after considerable suffering, aged fifty-nine, and was buried in the vestibule of St. Andrew's church in that town. As a comedian Mr. Mathews ranked deservedly high; but his greatest popularity was certainly achieved by his wonderful talent for personation and imitation, in the exercise of which his kind heart as well as good taste kept him guiltless of offence even to the most sensitive of those whose peculiarities of voice, manner, or person he so happily assumed. In private life Mr. Mathews was universally respected, and with him the stage lost a perfect gentleman as well as a distinguished professor. His memoirs, partly autobiographical, and edited by his widow, have been recently published in 8vo.

MATHIOLA, a genus of cruciferous plants with tapering pods, converging stigmas thickened at the back, a calyx with two saccate sepals, and compressed seeds arranged in a single row and surrounded by a thin membranous border. It consists of annual and perennial herbaceous plants inhabiting the warm countries bordering the Mediterranean, and extending eastwards into Persia and some of the southern Asiatic provinces of Russia. Between thirty and forty species are known to botanists, among which are those which form the stocks and gilliflowers of gardens, sweet scented biennials much valued for the beauty and variety of their many-coloured flowers. The principal source of these has been Mathiola incana, to which are to be assigned the hoary-leaved, or ten-week stocks; Brompton, and queen's; and M. glabrata, which comprehends the smooth-leaved, or green wallflower-leaved stocks: it is however probable that the numerous varieties now common in gardens under the name of German and Russian stocks have been procured, at least in part, by muling the former species with some of the sad-coloured species of the genus. The

latter are called Luperias by De Candolle, and are remarkable for their dingy flowers, which are exceedingly fragrant at night, but at no other time. M. livida, tristis, and L. odoratissima are the best known of them, and are frequently cultivated in greenhouses.

MATILDA, or MAUD, Empress. [HENRY I., II.]

MATILDA, Countess of Tuscany. [GREGORY VII.]

MATLOCK. [DERBYSHIRE.]

MATRASS, a glass chemical vessel, employed for the purpose of digesting, boiling, and distillation, and sometimes while one is used as the body, another serves as the receiver in the last-mentioned operation. Florence flasks are very commonly used for these purposes, and they answer admirably, on account of the excellent nature of the glass, which is such as to resist the effects of sudden alterations of temperature. Sometimes matrasses are very conveniently formed with flat bottoms, instead of their being round as in oil-flasks.

MATRIX, or GANGUE. Metallic ores are seldom found unmixed in the places in which they occur; they not only accompany each other, but are frequently associated with useless stony bodies, and these are called the matrix, or gangue.

It also happens that ores in some cases become gangues with relation to more precious minerals; those which may be distinguished as metallic gangues are iron pyrites, sparthose iron-ore, oxide of iron, hydrate of iron, and blende; the earthy gangues are usually quartz, felspar, limestone, carbonate of barytes, sulphate of lime, sulphate of barytes, and fluor-spar.

MATRONS, JURY OF. When a widow alleges herself to be with child by her late husband, and it is suspected that she is not pregnant, or not so by the husband, a writ de ventre inspiciendo may be obtained out of chancery, on behalf of the next heir, whose rights might be prejudiced by a supposititious, or spurious, child. Under this writ a jury of 'discreet and lawful women' is impannelled, to try, by inspection of her person (et ubera et ventrem tractando), whether the widow is with child or not, and if with child, to inquire of the time of conception, and of that of the expected delivery. If the widow be found to be pregnant, the sheriff, on returning the writ, certifies the court of common pleas to this effect; whereupon the widow, unless she be remarried (in which case she is not to be taken from her husband), is to be kept in a castle, or other safe place, until her delivery, in order, as far as possible, to prevent any child being improperly introduced as the issue of the husband, to the disherison of the heir. (Bracton, lib. 2, cap. 32; Croke, Eliz., 566; 6 Vesey, 260; 21 Viner's *Abr.*, 547.)

In the parliament roll of 9 Edw. II. (1 *Rot. Parl.*, 353, 354), is a curious proceeding, instituted on the 13th July, 1315, by the sisters and coheirs of Gilbert de Clare, earl of Gloucester, who had died on the 30th June, 1314, to recover their inheritance out of the king's hands, notwithstanding the alleged pregnancy of the countess, his widow. At the parliament held in January following (more than eighteen months after the death of the earl), the king's sergeants insisted that it was still the duty of the crown to retain possession of the estate for the benefit of the expected offspring, whose birth had *from natural causes* (permittente naturâ) been so long deferred; and it was not until Easter term, 1316, that the impediment was treated as removed.

A jury of matrons is also summoned to inquire into the fact of pregnancy in cases where a woman convicted of treason or felony, upon sentence of death being pronounced, pleads, in stay of execution, that she is with child. If the matrons impannelled to try this allegation find it to be true, the convict, whether she be married or unmarried, is respited until after her delivery. In some of the cases reported, the matrons have been directed to inquire whether the convict is *quick* with child; in other cases, and those by far more numerous, the inquiry seems to have been general, namely, *pregnant* or not pregnant. (Hawkins, *P. C.*, book ii., cap. 51, sec. 9) As the child is now known to have the same degree of fœtal life before as after the change of position which occasions the sensation called quickening, the latter form of the inquiry appears to be not only the more humane but also the more correct; more especially as the law has now rejected the distinction between quick and not quick, in cases of attempts to procure abortion. (7 Will. IV. & 1 Vict., c. 85, s. 6.) After delivery the convict is not to be executed without an award of execution by the court. But when called upon to say why execution should not be awarded against her, the convict cannot plead that she is again with child; such further pregnancy being considered not to be a sufficient ground for suspending, for a second time, the execution of the sentence. The gaoler is, under such circumstances, punishable for his negligence. But if the ground of the first postponement was the preservation of the infant, there seems to be no reason why the life of the second child should be sacrificed.

The form of proceeding where a woman alleges herself to be with child by her late husband, which is described in the passage of Bracton already referred to, is evidently taken from the Roman form of proceeding in a similar case, as described in *Dig.* 25, tit. 4, 'De Inspiciendo Ventre, custodiendoque Partu.'

MATSYS, QUINTIN, an eminent painter, born at Antwerp in 1460, is said to have followed the trade of a blacksmith or farrier till he was at least twenty years of age. His quitting his trade to take up painting has been ascribed to different causes. The story that has gained most credit (perhaps because it is the most romantic) is that he fell in love with a young woman whose father was resolved she should marry none but an artist. At all events he appears to have had great talents: his manner is singular, and different from that of any other master; his design is correct and true to nature, and his colouring forcible. His pictures are carefully finished, though rather dry and hard. It is thought by competent judges, that if he had been in Italy, and studied the antique and the great masters of the Roman school, he would have been one of the most eminent painters of the Low Countries. Though he generally took his subjects from ordinary life, he sometimes ventured with success into the higher departments of the art. One instance of this is a 'Descent from the Cross,' painted for the cathedral of Antwerp, and now in the museum of that city. His most remarkable and best known picture is that of the 'Two Misers,' of which there are numerous copies. The picture in the Royal Gallery at Windsor is supposed to be the original, but Dr. Waagen does not think it equal to its reputation. On the other hand he speaks in the highest terms of a 'Mary Magdalen,' half-length, three-quarters the size of life, in the gallery at Corsham House, the seat of Lord Methuen. His drawings are extremely rare. He died at Antwerp in 1529.

MATTER is the name given to every thing which is not mind. Such seems to be the only way of defining the word; and though the definition may appear to assume that mind is not matter, the contrary of which has been contended by the class of writers called materialists [MATERIALISM], yet it does not really do so. For whatever theory may be adopted as to the nature of mind, whether it is considered as a separate principle from matter, or merely as a different manifestation of the same principle, the word *mind* is indifferently retained; and our definition may consequently be at once reconciled with the materialist theory by paraphrasing it thus:—matter is the name given to the substance composing the universe, under all its different modifications, excepting only that one which is known by the name of mind.

Matter then is the name for that out of which all objects external to the mind are thought to be composed, the question being reserved, whether the mind is or is not composed of the same substance. What this substance is, to which the name of matter is given, we do not know, and have no means of knowing. Various speculations have been made as to its nature, and theories formed concerning the manner of its composition; but these have no better basis than conjecture. Other speculations have been made as to whether there is such a thing as matter or not; and some philosophers have seen in the solid world around us nothing but a creation of the mind. [BERKELEY; IDEALISM.]

There is no need to enter here into any of these speculations. It is sufficient to know and say that man, subject to certain affections of his senses, is led to assign those affections to an external cause. This external cause is that which he calls matter. What this matter is in itself he knows not. He knows only its capability of producing in him certain affections, the ordinary affections of the five senses (sensations, as they are called), and those which give the ideas of extension and resistance. Thus, having already supposed something without, he pronounces these to be qualities of that something; ignorant all the while what that something is, and knowing it only as the *substratum* of the qualities.

MATTHEW, ST., the Apostle and Evangelist, was a native of Galilee, and a publican or collector of customs and tribute under the Romans. While employed in his office at the city of Capernaum, he was called by Christ to follow him (*Matt.* ix. 9), and was afterwards chosen to be one of the apostles (*Matt.* x. 3). An account which corresponds in all respects to that of the conversion of Matthew as related by himself is given by *Mark* (ii. 14), and *Luke* (v. 27), respecting a publican named Levi, the son of Alphæus. Grotius and others have supposed that Matthew and Levi were different persons, whose conversion took place at the same time; but if so, why should Matthew relate his own conversion and omit all mention of that of Levi? As the three narratives plainly refer to the same time and place, and as Levi is not mentioned among the apostles, nor in any other passage of the New Testament, we may safely conclude that Matthew and Levi are names of the same person. Perhaps Levi was his proper name and Matthew a surname given him after his conversion, as that of Peter was to Simon. The Hebrew word Matthew (מַתִּיָה) signifies *a gift of Jehovah*, from מַתָּן, *a gift*, from נָתַן, *to give*.

In the *Acts of the Apostles* (i. 13), Matthew is mentioned with the other apostles as remaining in Jerusalem after the ascension of Christ. His subsequent history is quite uncertain. According to Socrates, an ecclesiastical historian of the fifth century, he went to Ethiopia (Soc., *Hist. Ecc.*, lib. i., c. 19); but according to another tradition, to Parthia. It has been a commonly received opinion that he was put to death at Naddabar, a city in Ethiopia (Cave's *Lives of the Apostles*, p. 178), but Heracleon, a Valentinian of the second century, mentions him among those of the apostles who escaped martyrdom. The passage is cited by Clement of Alexandria (*Stromata*, lib. iv., p. 502 B).

MATTHEW, ST., THE GOSPEL OF, is a canonical book of the New Testament, ascribed by the unanimous consent of the early Christian writers to the apostle Matthew.

It is not easy to determine the language in which this gospel was composed. That it was written in Hebrew (by which we are to understand the Syro-Chaldaic dialect spoken in Palestine in the time of Christ), and that it was composed for the Jewish Christians, is asserted by Papias (Eusebius, *Hist. Ecc.*, iii. 39), Irenæus (*Ibid.*, v. 8), Origen (*Ibid.*, vi. 25), Eusebius (*Ibid.*, iii. 24), and Jerome (*Comment. in Matt.*, *præf.*, and *De Vir. Illust.*, c. 3); and their account is followed by others of the early Christian writers. On the other hand it is argued in favour of a Greek original that these testimonies are inconclusive, for that Papias was a weak and credulous man, and that the other writers merely followed his account; that we find no traces of the actual existence of the Hebrew Gospel of Matthew, for all the quotations in the works of the early fathers are made from the Greek copy which we now have; that explanations are introduced which would be useless to Jewish readers (see *Matt.*, i. 23; xxvii. 33-46); that parallel passages of the Old Testament are generally quoted from the Septuagint; and that the Greek Gospel which we now have bears every mark of being not a translation but an original document. In order to reconcile these facts with the statements of the early writers, Dr. Whitby and others have supposed that there were *two* originals of the Gospel, one written in Hebrew for the Jewish converts, and the other in Greek for general use. They account for the absence of quotations or references to the Hebrew Gospel in the writings of the Fathers by supposing that it was corrupted by the Judaizing heretics to such a degree as to lose all authority, and that in this corrupted state it was the same document as that mentioned by Origen and other Fathers under the title of the *Gospel according to the Hebrews*. [GOSPEL.]

The date of St. Matthew's Gospel has been the subject of as much dispute as its original language. If it were written at first for the use of the Christians in Judæa, the date would probably be early; and it has been remarked that the exhortations which it contains to patience under persecution would be most acceptable to the Jewish Christians in their persecution by the Sanhedrim soon after the ascension of Christ. None of the early writers, except Irenæus, give any explicit testimony on the subject, but their statements appear to imply that this was the first written of the four Gospels, and also, what indeed Eusebius expressly asserts, that it was composed before Matthew left Judæa. On these grounds, and from the supposed improbability of the Christians remaining long without some written account of the life of Jesus, many critics have assigned it the date of about A.D. 38

But Irenæus says that it was put forth while Peter and Paul were preaching at Rome and laying the foundations of a church there. (*Adv. Hær.*, iii. 1, in Euseb, *Hist. Ecc.*, v. 8.) On the strength of this testimony Michaelis, Lardner, and others have fixed the date at A.D. 61 or 63, and Lardner has drawn an elaborate argument in favour of this date from the internal evidence of the book itself, in which he endeavours to show that Matthew understood many points in the Christian system which the Apostles did not understand till some considerable time after Christ's ascension. But as in these passages Matthew is recording the words and actions of Jesus, and not his own opinions, we cannot see any force in the argument.

Some of the advocates for a double original refer the Hebrew copy to the earlier date, and the Greek to the later.

The genuineness, authenticity, and canonical authority of this Gospel are established beyond dispute by the unanimous testimony of Christian writers from the earliest age, and by its place in the antient versions. But many critics have doubted the genuineness of the first and second chapters, chiefly on account of the difference between the genealogy of Christ in the first chapter, and that given by St. Luke (iii.), and other discrepancies between these chapters and Luke's account of the early life of Christ, and other internal difficulties, and also on the ground that they were omitted in the copies used by the Nazarenes and Ebionites, which however were undoubtedly corrupt. The chief arguments on the other side are, that these chapters are contained in *all* the antient MSS. and versions, that they are referred to and quoted by several of the Fathers, that the particle δὲ at the beginning of the third chapter shows that something had gone before, and that the style of these two chapters agrees with that of the rest of the Gospel, especially in the manner of quoting the prophecies of the Old Testament.

The general scope of St. Matthew's Gospel appears to be to show that Jesus Christ answered to the character of the predicted Messiah. It has been divided into four parts, as follows:—

Part I.—The genealogy, birth, and infancy of Christ. (Chaps. i. and ii.)

Part II.—The preaching of John the Baptist, Christ's baptism by him, and the temptation in the wilderness. (iii., iv. 1—11.)

Part III.—The public ministry of Christ. (iv. 12—xx. 16.)

Part IV.—His journey to Jerusalem, transactions there, his death and resurrection. (xx. 17—xxviii.)

The coincidences and discrepancies between this Gospel and those of Mark and Luke have been spoken of under LUKE, MARK, and GOSPEL.

St. Matthew was an Apostle and an eye-witness of the acts of Jesus, at least of those which were done after his call. His narrative has therefore the highest degree of credibility. His style of narration is simple and effective, and he relates the discourses of Christ with clearness, and often with great energy.

(Lardner's *Credibility* and *Lives of the Apostles and Evangelists*; Cave's *Lives of the Apostles*; Kuinoel, *Comment. in Lib. Hist. N. T. Proleg. in Matt.*; and the *Introductions* of Michaelis, Eichhorn, De Wette, Hug, and Horne.)

MATTHEW OF WESTMINSTER, one of those valuable old writers, the Latin chroniclers of England, who have handed down to us in a simple statement of facts the deeds of the sovereigns and the persons who guided public affairs at a remote period. Matthew spent his life near the antient palace of the kings of England, where the parliaments were usually held and the most important affairs transacted; for he was a monk of the abbey of Westminster, the church of the abbey being the usual place of interment of the kings and their families, and still remains to show of what a splendid establishment it formed a part. Matthew's date is the reign of Edward II. His history closes with the death of Edward I.; little or nothing is known of his personal history.

He entitles his work 'Flores Historiarum.' He begins with the creation of the world, and the first and least valuable half is taken up with affairs of other countries and our own before the Conquest. Two hundred and thirty-six pages in the Frankfort edition contain the history from the Conquest to the death of Edward I. This portion is very highly esteemed.

The reigns of female sovereigns have usually been favourable to our national history. In the reign of Elizabeth many of our best historians were printed, and of some of them more than one edition appeared. In the reign of Anne, Rymer's great collection of treatises and other important historical documents appeared. Matthew of Westminster was published in London in 1567, and again at Frankfort in 1601 in the same volume with Florence of Worcester, another writer of the same class, and a continuation of Matthew to the year 1377, the year of the death of Edward III.

MATTHIAS, Emperor. [HABSBURG, HOUSE OF; GERMANY, p. 190.]

MATTHISSON, FREDERICK, born at Hohendodeleben, near Magdeburg, in 1761, was a posthumous child, and brought up by his grandfather, a village pastor, until the age of fourteen, when he was sent to the school at Klosterbergen, and afterwards to the university of Halle, to study theology. His natural taste however led him to apply himself more to philology and general literature. Instead therefore of entering the church, he supported himself for some time as a private tutor at Altona, Heidelberg, and Mannheim, after which he resided for two years with his friend Bonstetten near the lake of Geneva. In 1794 he obtained the appointment of reader and travelling companion to the reigning princess of Anhalt-Dessau, and during the next seven or eight years visited Italy, the Tyrol, and part of Switzerland, relative to which countries his 'Briefe' and his 'Erinnerungen' furnish many interesting details, besides numerous sketches and anecdotes of distinguished literary persons and others with whom he became acquainted in the course of his tours. Although somewhat deficient in regard to simplicity of style, those works exhibit him to considerable advantage as a prose-writer; but it was as a lyric poet that he was the favourite of the German public, and will long continue to be admired for the happy delineation of external nature, and the touching melancholy and charm of sentiment which characterise his poems, besides their charms of style and versification. His 'Elegy in the Ruins of an old Castle' is hardly less popular than that of Gray is with us, being one of those productions which are of themselves sufficient to give the writer a lasting reputation. Matthisson also performed a good office for the poetical literature of his country by his 'Lyrische Anthologie,' a collection in twenty volumes, published at Zürich, 1805-7, and containing select pieces and specimens from 202 lyric poets, commencing with Weckherlin, Zingref, Opitz, and other earlier poets, and terminating with Tiedge. These volumes may be considered as a gallery where the specimens of the different masters are arranged chronologically, and exhibit the characteristic qualities of each. Matthisson died at Wörlitz, near Dessau, March 12, 1831.

MATTINS (from the Italian *mattina*, or the French *matin*, morning), strictly the first part in the daily service of the Romish church. Matins or mattins however were divided into two parts, which were originally distinct offices and hours; namely, the *nocturn and matin lauds*. The *nocturns* or vigils were derived from the earliest period of Christianity. We learn from Pliny the younger, as well as from Justin Martyr, Tertullian, and various writers of the first three centuries, that the Christians in those times of persecution held their assemblies in the night, in order to avoid detection. On these occasions they celebrated the memory of Christ's death in the holy mysteries. When persecution had intermitted and finally ceased, although the Christians were able to celebrate all their rites, and did administer the sacrament in the day-time, yet a custom which had commenced from necessity was retained from devotion and choice; and nocturnal assemblies for the worship of God in psalmody and reading still continued. The monastic orders, which, in the fourth century, arose under Pachomius, Anthony, Basil, and others, in Egypt, Pontus, and Syria, tended to preserve this custom of nocturnal vigils; and in the following centuries we find, from the testimony of Cassianus, Augustine, and others, that the same custom remained in most parts of the East and West. In the sixth century Benedict, the great founder of monastic societies in the West, prescribed the same in his Rule; and nocturnal assemblies were common about that time, especially in monasteries. The *lauds*, or more properly *matin lauds*, followed next after the nocturns, and were supposed to begin with day-break. We find allusions in the writings of Cyprian, and all the subsequent fathers, to the morning as an hour of prayer; but whether there was in the third century any assembly of the church for the purpose of public morning worship is uncertain. However, about the end of the third or beginning of the fourth century there was public worship at this hour, as we learn from the 'Apostolical Constitutions,' where we have the order of the service. (Bingham's *Antiquities of the Christian Church*, b. xiii.; Palmer's *Origines Liturgicæ*, 8vo., Oxford, 1832, vol. i., p. 201-3; *Apostol. Constit.*, l. viii., c. 38.)

MATTO GROSSO. [BRAZIL.]

MATU'TA, the name of a genus of brachyurous crustaceans. [OXYSTOMES.]

MATY, MATTHEW, M.D., the son of Paul Henry Maty, a Protestant clergyman, was born in Holland in 1718, at Montfort near Utrecht, and was originally intended for the church; but in consequence of some mortifications which his father received from the synod on account of particular theological sentiments, his thoughts, when he grew up, were turned to physic. He took a degree at Leyden; and in 1740 came to settle in England, his father being determined to quit Holland for ever. His earliest patron in England appears to have been Lord Chesterfield. In 1750 he began to publish, in French, an account of the productions of the English press, which he printed at the Hague, under the name of 'Journal Britannique;' a publication which Gibbon praised, as exhibiting a candid and pleasing view of the state of literature in England for the space of six years, from January 1750, to December 1755. It answered its intention, and introduced Dr. Maty to the most eminent literary persons of the country. In 1756, as soon as the establishment of the British Museum was completed, he was appointed one of the first under-librarians of that institution. In 1758 he became a fellow, and in 1765, upon the resignation of Dr. Birch, was chosen Secretary of the Royal Society. In 1772, upon the death of Dr. Gowin Knight, Dr. Maty, by his majesty's appointment, became principal librarian of the British Museum. He died of a lingering disorder, August 2, 1776. His body being opened, the appearances which presented themselves were considered so singular that they were described before the Royal Society by Dr. Hunter, whose account of them was inserted in vol. lxvii. of the 'Philosophical Transactions.' Dr. Maty was an early and active advocate for inoculation; and when a doubt was entertained that a person might have the smallpox, after inoculation, a second time, he tried it upon himself, unknown to his family. Besides various smaller pieces, he published,—1, 'Mémoire sur la Vie et sur les Ecrits de M. Ab. de Moivre,' 12mo., Haye; 2, 'Authentic Memoirs of the Life of Richard Mead, M.D.,' 8vo., London, 1755. At the time of his death he had nearly finished the 'Memoirs of the Earl of Chesterfield,' which were completed by his son-in-law Mr. Justamond, and prefixed to that nobleman's 'Miscellaneous Works,' 2 vols. 4to., 1777. Dr. Maty was Lord Chesterfield's executor. (Nichols's *Anecd. of Bowyer*; Gibbon's *Memoirs*, vol. i., p. 87; *Biographie Universelle*, tom., xxvii., p. 485-487.)

MAUBEUGE. [NORD.]

MAULE'ON. [PYRENEES, BASSES.]

MAUNDY THURSDAY, the Thursday preceding Easter, on which the king or queen distributes alms to a certain number of poor persons at Whitehall; so named from the *maunds*, or baskets, in which the gifts were formerly contained. It was also called Shere Thursday, as we read in the 'Festival' of 1511; because antiently 'people would that day shere theyr hedes and clypp theyr berdes, and so make them honest agenst Easter-day.'

The following was the ceremonial of the maundy as practised in 1731. 'Thursday, April 15th, being Maundy Thursday, there was distributed at the Banquetting House, Whitehall, to forty-eight poor men and forty-eight poor women (the king's age, forty-eight), boiled beef and shoulders of mutton, and small bowls of ale, which is called dinner; after that, large wooden platters of fish and loaves, viz. undressed, one large old ling, and one large dried cod; twelve red herrings and twelve white herrings; and four half-quartern loaves. Each person had one platter of this provision; after which was distributed to them shoes, stockings, linen and woollen cloth, and leathern bags, with one-penny, two-penny, three-penny, and four-penny pieces of silver, and shillings; to each about four pounds in value. His grace the lord archbishop of York, lord high almoner performed the annual ceremony of washing the feet of a certain number of poor in the royal chapel, Whitehall, which

was formerly done by the kings themselves, in imitation of Our Saviour's pattern of humility.'

James II. was the last of our kings who performed this ceremony of washing the feet in person. In 'Le Guide de Londres pour les Estrangers, recueilli et composé par F. Colsoni,' 8vo., Lond., 1693, p. 33, we read, 'Le Jeudy Saint, le Roy, selon un fort ancienne coutume, lave les pieds à tout autant de viellards qu'il a d'années; et la Reine de meme à autant de vieilles femmes qu'elle a d'annees.' The third edition of this work, 8vo., p. 43, adds, 'Mais le Roy G. III. (Guillaume III.), a laissé l'intendence de cette ceremonie a son grand Aumonier ou un Evéque du Royaume.'

The 'Times' newspaper of April 16th, 1838, records the change in this ceremony as it stands at present. 'The queen's royal alms were distributed on Saturday by Mr. Hanby, at the almonry office, to the maundy men and women placed on the supernumerary lists, owing to the difference of the ages between the late king and her present Majesty. Both men and women received 2*l*. 10*s*., and nineteen silver pennies (being the age of the queen). To the men, woollen and linen clothing, shoes, and stockings were given; and to the women, in lieu of clothing, 1*l*. 15*s*. each. The maundy men and women also received 1*l*. 10*s*., a commutation instead of the provisions heretofore distributed.'

The custom of the maundy is of considerable antiquity. Augustine, according to Du Cange, is first quoted for it. In England at least it was not entirely confined to royalty. In the earl of Northumberland's 'Household Book,' begun in 1512, fol. 354, we have an enumeration of 'Al maner of things yerly yeven by my lorde of his maundy, ande my laidis, and his lordshippi's childeren.'

Dr. E. D. Clarke, in his 'Travels in Russia,' 4to., Cambr. 1810, vol. i., p. 55, gives an account of the ceremonial of washing the feet of the apostles, as it is called, on this day at Moscow. 'This,' he says, 'we also witnessed. The priests appeared in their most gorgeous apparel. Twelve monks, designed to represent the twelve apostles, were placed in a semicircle before the archbishop. The ceremony is performed in the cathedral, which is crowded with spectators. The archbishop performing all, and much more than is related of our Saviour in the 13th chapter of St. John, takes off his robes, girds up his loins with a towel, and proceeds to wash the feet of them all until he comes to the representative of St. Peter, who rises, and the same interlocution takes place as between our Saviour and that apostle.'

(Nares's *Glossary*, v. 'Maund;' Brand's *Popular Antiq.*, 4to. edit., vol. i., p. 124-128; *Gent. Mag.*, vol. i., p. 172; Fosbrooke's *Encyclopædia of Antiquities*, p. 702.)

MAUPERTUIS, PIERRE-LOUIS MAREAU DE, was born at St. Malo, 17th July, 1698. Upon quitting the army, in which he held the rank of captain of dragoons, he applied himself assiduously to the study of the mathematics and astronomy, partly under the instruction of M. Nicole. In 1723 he was admitted a member of the Royal Academy of Paris, and in 1727 a member of the Royal Society of London. At this time the error in the measurement of the arc of the meridian conducted by Dominic and James Cassini had not been detected. It is well known that the result of this survey was directly at variance with the conclusion to which Newton had arrived relative to the figure of the earth: and although several of the geometricians of the day were of opinion that the comparison of degrees in latitudes so nearly contiguous (for the measured arc consisted of two conterminous portions, the difference of the mean latitudes of which was little more than 4°) could not be considered decisive, inasmuch as the errors incidental to the survey could not be supposed to be confined within such narrow limits as the small difference of length which the survey was employed to detect; still it afforded to others, who were interested in refuting the Newtonian theory, plausible grounds for disputing the oblate figure of the earth, to which that theory had led. To set the question at rest, Bouguer and La Condamine were sent to Peru; and during their absence Maupertuis, in company with Clairaut, Camus, Lemonnier, and Outhier, were deputed by the Academy to measure an arc of the meridian in Lapland. They were afterwards joined by the Swedish astronomer Celsius, who brought with him from London instruments made by Graham, of a very superior construction to any then in use. The party reached the gulf of Bothnia in July, 1736, intending to fix their trigonometrical stations upon the islands of the gulf; but upon examination, they found the valley of the river Tornea more eligible for the purpose, and, in December following, commenced measuring a base of 7407 toises upon the frozen surface of that river. An account of this survey was published by Maupertuis in 1738: 'La Figure de la Terre,' 8vo., Paris, 1738. The result was that the difference of latitude of the extreme stations, namely, the town of Tornea and the mountain Kittis, was 57′ 29″.6, and that the length of the corresponding arc was 55,023 toises, from which it followed that a degree of the meridian in 66° N. lat. exceeded a degree in the latitude of Paris by 512 toises, and consequently tended to prove that the earth's figure was that of an oblate spheroid. The survey was repeated in the years 1801-2-3, by Svanberg, whose result differed from that of Maupertuis by 226 toises.

Maupertuis was one of the first among his countrymen who defended the Newtonian theory against the attacks of Descartes, and when his opinion was confirmed by the result of his survey, he became an open and strenuous opposer of the Cartesian philosophy. When Frederic II. was about to re-organise the academy of Berlin, he offered the presidency to Maupertuis, who, tired of his stay in Paris, where, says M. Delambre, the reputation of many had a tendency to eclipse his own, eagerly assented to so honourable a proposition. But his residence at the court of Prussia, which dates from 1745, seems to have been chiefly occupied in cultivating the good graces of Frederic, and he showed little interest as to scientific research except such as had reference to his survey in Sweden. His vanity on this point was conspicuous. In the portrait which he had painted of himself he is represented in the act of compressing the poles of the earth. He died at Basle, 27th July, 1759, at the house of two of the sons of John Bernoulli, with whom he had always been on terms of friendship. His latter years were embittered by a dispute with Koenig, professor of mathematics at the Hague and foreign associate of the academy of Berlin, respecting a mechanical principle of considerable importance, which Maupertuis appears to have been the first to promulgate, and from which he deduced the laws of the reflexion and refraction of light, and those to which the collision of bodies are subjected, but of which he was unable to give any general demonstration. This principle, which he designated 'the principle of least action,' he enunciated in terms identical with those employed at the present time (see his *Essai de Cosmologie*, Leyden, 1751, p. 70), although he probably attached to them a somewhat different signification. Koenig endeavoured to show, first, that the same principle had been previously advanced by Leibnitz; secondly, that it was not true. The academy of Berlin, to whose arbitration the dispute was referred, decided in favour of Maupertuis, and ordered the name of Koenig to be erased from their list of associates; but even this decision, added to the support of the celebrated Euler, seemed inadequate to compensate Maupertuis for the raillery of Voltaire, who, although totally incompetent to judge on the scientific merits of the case, had taken the part of Koenig, and published his satirical piece entitled 'Diatribe du Docteur Akakia, Médecin du Pape,' wherein he was too successful in turning into ridicule both Maupertuis and his 'principle.' Frederic, who disliked Maupertuis, laughed at the satire, but ordered it to be burnt by the common executioner, which led to Voltaire's asking and obtaining permission to leave Berlin. (*Vie de Voltaire*, par Condorcet.) The following list of the published works of Maupertuis is given in Quérard's 'Dictionnaire Bibliographique:'—

'Anecdotes, physical and moral,' 12mo., no date. 'Nautical Astronomy, or Elements of Astronomy, alike applicable to a fixed and moveable Observatory,' 8vo., Paris, 1743 or 1751; Lyon, 1756. 'Memoirs read before the royal academies of France and Prussia,' 16mo., Dresden, 1753. 'Memoir on the Moon's Parallax,' 1755. 'Discourse on the different Forms of the Stars, with an Exposition of the Systems of Descartes and Newton,' 8vo., Paris, 1732 and 1742. 'A Latin inaugural and metaphysical Dissertation on the System of Nature,' 12mo., 1751. The same in French, Berlin, 1754. 'Dissertation on the White Negro,' 8vo., 1744. 'Elements of Geography,' 8vo., Paris, 1740. 'Eloge of Montesquieu,' 8vo., 1755. 'Essay on Cosmology,' 8vo., Berlin, 1750. 'Essay on Moral Philosophy,' Berlin, 1749; and London, 1750. 'Disinterested Examination of the different Undertakings for determining the Figure of the Earth,' Oldenburg, 1738; and Amsterdam, 1741. 'Examination of the three Dissertations published by M. Des-

aguliers on the Figure of the Earth,' Oldenb., 1738 (this book, by some attributed to Maupertuis, is supposed to have been written by the Count de Bièvre). 'The Figure of the Earth, as determined by the Observations of MM. Maupertuis, Clairault, Camus, Le Monnier, Outhier, Celsius, &c., near the Polar Circle,' Paris, 8vo., 1738. 'Letter to Madame de Vertillac,' Paris, ——. 'Letter to Euler,' ——. 'Letter of an English Clockmaker to an Astronomer of Pekin,' 12mo., 1740 (a humorous satire against MM. de Cassini on the subject of the measurement of the meridian). 'Letter upon a Comet,' Paris, 1742. 'Letter on the Progress of the Sciences,' Berlin, 1752. 'The Measurement of a Degree of the Meridian between Paris and Amiens, determined by Picart, with the Observations of MM. Maupertuis, Clairaut, Camus, and Le Monnier,' 8vo., 1740. 'Miscellaneous Works,' 12mo., Amsterd., 1744. 'Philosophical Reflections on the Origin of Language and the Signification of Words,' 12mo. 'A Method of superseding the action of the Wind,' 1753. 'Venus physique,' 1745 and 1777. The works of Maupertuis were collected and published at Dresden, in 1752, 4to.; and at Lyon, in 1754 and 1768, in 4 vols. 8vo. Among his memoirs in the Transactions of the French Institute, his 'Balistic Arithmetic,' 1731, and an elegant Commentary upon the 12th section of the first book of the 'Principia,' 1732, deserve particular mention.

(*Life of Maupertuis*, by Delambre, in the *Biographie Universelle*; Montucla, *Histoire des Mathématiques*, &c.)

MAUR, ST. There appear to have been two persons of this name: one a disciple of St. Benedict, who is mentioned in St. Gregory's 'Dialogues,' and who is said to have died in 584; the other, abbot of Glanfeuil, who lived till 640, and was a monk of the order of St. Colomban, and not of St. Benedict. Of the former of these a Life is extant in the great work of the Bollandists. His day was the 15th of January.

(Moreri, *Diction. Historique*, tom. vii., fol., Par., 1759, p. 357; Alban Butler's *Lives of the Saints*, 8vo., Dubl. 1779, vol. i., p. 169.)

MAUR, ST., CONGREGATION OF, a celebrated society of Benedictines in France, who professed to follow the primitive rule of that order. It was first established in 1618. Pope Gregory XV., at the instance of Louis XIII., gave it his approval by his brief dated 17th May, 1621; and Urban VIII. granted it new privileges by a bull dated 21st January, 1627. The report of the sanctity of this congregation induced several bishops, abbots, and monks to submit their monasteries to the direction of its superior, so that the congregation at last became divided into six provinces, of which each contained about twenty religious houses. The most considerable were, St. Denys, St. Germain-des-Prés, St. Remi at Rheims, Marmonstier, St. Pierre de Corbie, Fleuri or St. Benoit sur Loire, Fescamp, and the Trinité de Vendôme. The monks, beside the rule of St. Benedict, had other particular statutes and constitutions, and were governed by a general superior, assistants, and visitors, who held a general chapter every three years at Marmonstier. Those who have any acquaintance with the history and progress of learning in Europe will readily acknowledge the advantages which letters have derived from this famous congregation, whose researches took in the whole circle of sciences, philosophy excepted. Among its more eminent members in the seventeenth century may be enumerated Hugh Menard, Luc d'Acheri, Jean Mabillon, Thierri Ruinart, and Bernard de Montfaucon. Moreri gives a list of the general-superiors of this congregation from 1630 to 1756.

(Moreri, *Diction. Historique*, tom. vii., pp. 357, 358; *Histoire Littéraire de la Congrégation de Saint Maur*, 4to., Bruxelles, 1770, by Dom Tassin.)

MAURA, SANTA. [SANTA MAURA.]

MAURIAC. [CANTAL.]

MAURICE of NASSAU. [NASSAU, HOUSE OF.]

MAURITA'NIA or MAURETA'NIA, which derived its name from its inhabitants Mauri or Maurusii (Μαυρούσιοι), was bounded on the west by the Atlantic, on the north by the Mediterranean, on the south by the Gætuli, and on the east by Numidia, thus corresponding to the northern part of Marocco and the western part of Algiers. The country of the Mauri was originally separated from that of the Massæsyli by the Molocath (Strabo, p. 827, Casaubon) or Mulucha (Plin., v. 1), the modern *Mulwia* or *Mohalou*: but the Roman province of Mauritania included the country inhabited by both these people

Before the war with Jugurtha, the Romans had little or no knowledge of Mauritania; of which Bocchus was at that time the ruler. (Sallust, *Bell. Jugurth.*, c. 19.) Mauritania was afterwards given by Augustus to Juba II., his paternal kingdom of Numidia having been erected into a Roman province. [JUBA.] Juba died about A.D. 17, and was succeeded by his son Ptolemæus, who was put to death by Caligula. Mauritania was shortly afterwards divided into two provinces by Claudius (A.D. 43); which were called respectively Mauritania Tingitana and Mauritania Cæsariensis. (Dion Cassius, lx., p. 771, Stephan.) Tingitana, the western province, which derived its name from Tingis (*Tangier*), was divided from the other province Cæsariensis by the Molocath; and Cæsariensis was separated from Numidia by the Ampsagas (*Wadi al-Kebir*). Mauritania Cæsariensis was subsequently subdivided into two provinces: the western part retained the name of Cæsariensis, but the eastern was called Sitifiensis, from Sitifi (*Setif*), a town on the borders of Numidia.

Mauritania contained many towns of considerable importance under the Roman empire. Of these, the principal in Mauritania Tingitana were, Ru-adir (*Melillah*), a seaport and a Roman colony, west of the Molocath; Tingis (*Tangier*), at the entrance of the Straits of Gibraltar, which received especial marks of favour from Augustus Cæsar (Dion, xlviii., p. 439), and became a Roman colony under Claudius (Pliny, v. 1); Zilis or Zelis (*Arzilla*), made a Roman colony by Augustus under the name of Julia Constantia Zilis, and placed under the same jurisdiction as the province of Bætica in Spain (Plin., v. 1): it was situated a little to the south of C. Spartel, which is called Cotes by Strabo (p. 825, Casaubon), and Ampelusia by Mela (i. 5); Linx, Lixus, or Linga (*Al Araish*), a Roman colony, 32 Roman miles south of Zilis, situated on a river of the same name, which must not be confounded with the great river Lixus mentioned in Hanno's 'Periplus,' which is probably the same as the modern St. Cyprian [HANNO'S PERIPLUS]; Banasa, a Roman colony, 50 Roman miles south of Lixus, situated on the Subur (*Seboo*): and, 50 miles south of the Subur, Sala (*Salee* or *Sla*), of which there are extensive ruins.

The chief towns in Mauritania Cæsariensis were: Salda, Sarda, or Saldæ (*Boujayah*), a seaport and a Roman colony, which divided the kingdom of Juba from the province of Numidia (Strabo, p. 831): Julia Cæsarea (*Zershal*, see Shaw, p. 40, 41, ed. of 1738), situated on the coast west of Saldæ, a Roman colony, which was originally called Iol (Strabo, p. 831: Pliny, v. 1); Siga (*Takumbrit*), which Pliny (v. 1) erroneously places opposite Malaga in Spain; and in the interior, south-west of Cirta, the important town of Sitifi (*Setif*), a Roman colony.

The physical features, &c. of Mauritania are described under articles the ALGIERS and MAROCCO. The best account of the eastern part of Mauritania is in Shaw's *Travels*.

MAURITIUS, the Island of, called also ISLE DE FRANCE, is situated in the Indian Ocean, between 19° 45′ and 20° 33′ S. lat., and between 56° and 57° E. long. From north to south, from Cap Malheureux to the Bay of Lemontrees (citronniers), its length is about 36 miles: and its extreme width from Point du Diable to the northern extremity of the Plaine aux Sables (Plain of Sand) is nearly 27 miles, though in general it is little more than 18 miles. The circuit is about 124 miles. The area is about 700 square miles, or nearly the extent of the county of Worcester.

The island is surrounded by a coral reef, generally running parallel to the shores, at the distance of one or two furlongs, and mostly dry at low water. In this reef occur eleven breaks, by the greater number of which vessels of considerable burden may approach the island. The water between the reef and the shores, being less agitated than the open sea, affords facilities of communication between the places along the coast, which is the more important as the shore in several places rises with a steep ascent and to a considerable elevation close to the water-edge. This is especially the case along the western coast. Along the eastern coast the surface is pretty level from Port Soulliac to Grand Port, and from the latter to Port Louis, except in the immediate neighbourhood of both places. The interior of the island consists of a great number of lofty hills, which however are mostly isolated, except between Cape Brabant and Port Soulliac, where they constitute a small chain, and another chain runs from the mountain of Peter Botte to Cannonière Point. Some of the hills attain a considerable elevation, especially the Brabant mountains, near Cape

Brabant, and the Bamboo ridge, near Grand Port, which probably rise to 3000 feet above the sea-level. The origin of the island is without doubt volcanic, as shown by the irregularities of the surface, the presence of lava, pumice, and other volcanic productions. In the mountains at the back of Port Sonilac and Grand Port is a small lake, which is considered to be an extinct crater. The ground is generally covered with loose rocks, from the size of a man's fist to pieces weighing a ton or more, and they are full of holes. The soil is shallow, and by no means distinguished by fertility, which is mainly to be attributed to its dryness and the frequent want of rain. It consists principally of a lumpy reddish mould, evidently impregnated with oxide of iron, and crumbling to dust in the hand.

The rainy season lasts from November to March or April. The rain comes down in torrents for several hours continually, and is accompanied with heavy gusts of wind: thunder and lightning are frequent. Hurricanes as terrific as those of the West Indies sometimes visit the island during this season. They do not occur with any regularity; but five years rarely elapse between their visitations. During this season the wind frequently changes, and sometimes makes the tour of the horizon. In the dry season the wind generally blows from the south-east. It is strong during the day, but calm in the night. During the months of June, July, and August, showers are frequent, but they last only a short time. The island is traversed by numerous watercourses, which run off from the centre towards all points of the compass; but they are only filled with water during the rainy season, when they form numerous cataracts: during the dry season the water is speedily evaporated by the heat of the sun. The mean annual heat is about 76° Fahrenheit. The fall of rain from the 1st of October, 1831, to the 30th of September, 1832, was 38 inches. We have not been able to obtain any further account of the quantity of rain. The highest observed temperature in the year above mentioned was 87°, and the lowest 60° of Fahr.

This island was formerly covered with woods, and even now a considerable part of the native forest is allowed to remain for ornament round the plantations: the hilly districts in the interior are covered with trees. There is however no timber fit for ship-building. The ebony wood is of inferior quality, but the iron-wood and red-wood are valuable. The sago and cocoa-nut palms are common, as also tamarind-trees, mangroves, and bamboos. Yams, cassava or manioc, which was brought from South America, and Indian corn, are cultivated as articles of food; as well as plantains, bananas, and melons, with several European vegetables, as spinach, asparagus, artichokes, cabbages, and peas. Wheat and rice are raised in small quantities, and both articles are imported, the former from the Cape and the second from Madagascar. There are also mangoes, shaddocks, and pine-apples. Oranges, grapes, peaches, and apples are of inferior quality.

The French introduced the spice-trees of the Indian islands, but none of them succeeded, except the clove; even the pepper-vine remained barren. They also cultivated sugar, indigo, coffee, and cotton. But since the British have been in possession of the island, all these branches of agriculture have been nearly abandoned, with the exception of sugar. The cultivation of sugar has rapidly increased; in 1830 more than 720,000 hundredweights were exported.

Horses are few, and seldom bred in the island. Mules and asses are more numerous, and principally used for the saddle. Black cattle are scarce, on account of the want of good pasture, the pasture-grounds being few and bad. Cattle are imported in great numbers from Madagascar; goats and sheep are numerous; hogs abound, and form a material part of the food of the people. The forests contain hogs and deer, neither of which are probably indigenous. Fish is abundant along the coast: the turtle has almost wholly disappeared, but all the small sandy islets situated to the north-west of Mauritius afford them in abundance, and they are large and fine. Rats, locusts, and ants are destructive to the plantations and storehouses.

The population amounts to about 100,000, of which number about 76,000 are negro slaves brought from Madagascar and the eastern coast of Africa. The number of coloured free people exceeds 15,000, and among them are Malays, fishermen from the coast of Malabar, Lascars, and Chinese. The Chinese have lately been brought over, and employed in the cultivation of the sugar-cane, instead of the negro slaves. The number of whites amounts to about 9000 individuals: the greater part of them are descendants of French families, and speak the French language.

Port Louis, the capital and only town of the island, is situated near the north-western extremity, on a small bay called Port North-West, or Port Louis. This bay is a narrow inlet of the sea, somewhat more than a mile long, and about five hundred yards broad. A reef runs out from its mouth, passing close to a small island, called Tonnelier Island, a coral rock, near which vessels usually anchor, as the wind continually blows out of the harbour. The harbour is sufficiently capacious for a dozen men-of-war and fifty sail of merchant ships, and during the fine season perfectly safe. At its extreme south-western corner the town is built. The streets are straight but not paved; the principal street runs parallel to the shores of the bay. The houses are all built of wood, with only one floor. The town contains 26,000 inhabitants, of which number 15,700 are slaves, 4000 whites, and the remainder coloured free people. One of the suburbs contains about 3000 Malabar fishermen, and another about 7500 free negroes. There is a library containing more than 60,000 volumes, mostly French books, a good botanical garden, and some docks for the repair of vessels.

On the windward coast of the island is Port Grand, also called Port South-East, which is large, but its entrance is very difficult, being narrowed by several shoals. It can only be entered and left with a fair wind, as it is impossible to tack. It is not much frequented.

The commercial relations of Mauritius extend to Batavia, Bombay, Surat, Muscat, the Persian and Arabian Gulfs, the western coast of Africa, the Cape, and Madagascar, but a considerable portion of its produce comes to England. Besides sugar, small quantities of indigo, coffee, cloves, and some woods are exported. The island receives from England and India silk and cotton goods, and from England besides, cloth, wine, oil, hats, iron, and steel utensils, with some smaller articles. Madagascar supplies the Mauritius with cattle and rice, and receives in return manufactured goods. Arabia and Persia are supplied with sugar from the Mauritius, and send in return dry fruits and some smaller articles.

Mauritius, with the neighbouring island of Bourbon, was discovered by the Portuguese under the command of Mascarenhas in 1505, and the whole group was called the Mascarenhas Islands; but though the Portuguese took possession of Mauritius in 1545, they apparently formed no settlement on it. The Dutch surveyed it in 1598, and called it Mauritius, in honour of Maurice, stadtholder of the republic of the Netherlands. They did not however settle here till they had formed an establishment at the Cape in 1640, about which time they fixed themselves on the shores of Port South-East. From unknown reasons they abandoned the island in 1708. Between this year and 1715 it was only inhabited by a few negroes who had been brought there by the Dutch as slaves, and had run away from their masters and concealed themselves in the mountain forests. In 1715 the French took possession of the island, formed a settlement at Port North-West, and called the island Isle de France. They remained in the undisturbed possession of it to the year 1810, when it was taken from them by the British, who since the peace of 1814 have retained it in their possession.

(*A Voyage to the Island of Mauritius*, by a French Officer; Tombe's *Voyage aux Indes Orientales*; Prior's *Narrative of a Voyage in the Indian Seas*; Grant's *History of Mauritius.*)

MAURO'LICO, or MARULLO, FRANCIS, abbot of Messina, was born at that place, September 16, 1494, and died there, July 21, 1575. Several accounts, which do not conceal the age which he attained, state that he was prematurely sacrificed to excess of study. His life was written by his nephew of the same name, and was published at Messina in 1613; we have not seen this work, but it is much used, and freely quoted, in the Abbé Domenico Scina's 'Elogio,' Palermo, 1808, which contains a full but flattered account of the life and writings in question. Maurolico taught mathematics publicly at Messina, and lived in habits of close friendship with Cardinal Bembo. These, and his being obliged, much against his will, to suppress a part of his dissertation on comets, on account of the offence which some passages gave to certain Venetian noblemen, are the only circumstances of his personal life which are worth recording.

The printed works of Maurolico are numerous, and those which he wrote still more so; a list of all (but without titles or dates for the printed works) is given by the Abbé Scina. Among the former must be mentioned an edition of Autolycus with commentaries, Messina, 1558, folio; of ARCHIMEDES, 1670 (misprinted 1570 in the article cited) and 1681 (or 1685?): the Phenomena of Euclid, 1588, and an edition of Theodosius and Menelaus in the same year, which contains a table of secants, being the first introduction of these lines; 'Opuscula,' printed at Venice, 1575, containing treatises on the sphere, the calendar, astronomical instruments, gnomonics, music, and arithmetic; treatise on Cosmography, 1543. Other works have been stated as printed, but we have only inserted those which have good authority.

Maurolico will be remembered by his geometrical writings, particularly his manner of treating the conic sections, by his optical theorems, and by his arithmetical works; but the interest which attaches to his writings connects them rather with the general history of the science than with his own biography, as there are no very prominent discoveries to record. In his arithmetic he proceeds upon geometrical principles, as his eulogist states (and with confirmatory descriptions and citations), but at the same time with an attempt to generalize operations into rules, and to present them in a form closely approaching to the modern algebra, to the spirit of which they approach, without the language. It is to be remembered that before the time of Vieta the method of expressing general formulæ, which now constitutes the foundation of algebraical language, did not exist; and it seems to us, from such parts of Maurolico's writings as we have seen cited (the works themselves are very scarce), that the transition from the arithmetic of Euclid to that of Maurolico is an approach to algebra of a character which deserves more attention than it has met with from historians. These writers, so far as algebra is concerned, do not even mention the name of Maurolico, a circumstance which must be explained probably by the latter not being in the line of investigation of Cardan, Tartaglia, and those who lie in the direct track between the Hindu algebra and that of Vieta. Nevertheless the propositions of Maurolico on the summation of series, and the methods by which they were deduced, form a very curious step in the progress of arithmetical inquiry.

M. Chasles, in his lately published work on the history of geometry [GEOMETRY, page 156] carries his opinion of Maurolico as an algebraist, to a startling degree of novelty. 'Analysis is infinitely indebted to this geometer, who nevertheless is very little cited on the subject. It is he who first introduced the use of letters instead of numbers, and who gave the first rules of the algorithm of algebra.' Not having examined Maurolico ourselves, we can only say that neither Wolff, nor Cossali, nor the Abbé Scina, could find this out; the last expressly speaks of Maurolico as having 'the spirit of algebra, without the language.' Perhaps however the assertion of M. Chasles may provoke some attention to the subject, and excite an inquiry into the extent of the claim which Maurolico really has to be considered as one of the founders of algebra; an inquiry which, terminate how it may, has been yet hardly begun.

MAURUS TERENTIA'NUS, a Latin grammarian, who is said to have been born at Carthage. The time in which he lived is uncertain. Vossius supposes him to have been the same Terentianus who is addressed by Martial as the prefect of Syene in Egypt (*Epigram*, i. 87); and he at all events lived during or before the time of St. Augustine, since he is mentioned by the latter in terms of the highest respect. (*De Civitate Dei*, vi. 2; *De Utilitate Credendi*, c. 17.)

The only work of Maurus which has come down to us is entitled 'De Litteris, Syllabis, Pedibus, et Metris Carmen.' It is included in the 'Grammatici Veteres,' edited by Putschius, Hanover, 1605; and has been also edited by D. J. V. Lennep, Leyden, 1825, and by Lachmann, Leipzig, 1836.

MAUSOLE'UM is now used as a general term applied to a sepulchral chapel or edifice erected for the reception of a monument; but it originally designated the magnificent structure raised by Artemisia as the tomb of her husband Mausolus, king of Caria, at Halicarnassus, B.C. 352. Of this monument, once reckoned among the wonders of the world, no remains now exist; but from Pliny's description (xxxvi., 5) it appears to have been nearly square in its plan, measuring 113 feet on its sides, and 93 on each of its ends or fronts, and to have been decorated with a peristyle of thirty-six columns (supposed by Hardouin to have been 60 feet high, or upwards), above which the structure was carried up in a pyramidal form, and surmounted at its apex by a marble quadriga executed by Pythis, who, according to Vitruvius, was joint architect with Satyrus in the building. It was further decorated with sculptures and reliefs by Scopas, Bryaxis, Timotheus, and Leochares. The entire height was 140 feet.

The mausoleum erected at Babylon by Alexander the Great, in honour of Hephæstion, appears to have been still more magnificent, and somewhat extravagant in its decorations, as far as can be gathered from the account given of it by Diodorus (xvii. 115). It was adorned below by the gilded rostra, or beaks, of two hundred and forty ships, and every successive tier or story was enriched with a profusion of sculpture, representing various animals, fighting centaurs, and other figures, all of which were gilt; and on the summit were statues of sirens, made hollow, in order that the singers who chanted the funereal dirge might be concealed within them.

Those of Augustus and Hadrian at Rome were structures of great magnitude and grandeur, and resembled each other in being circular in plan. The first stood in the Campus Martius, where remains of it yet exist in the two concentric circles forming the first and second stories of the building, and the vaulted chambers between, which supported the first or lowest terrace. Of these terraces there were three; consequently four stages in the building, gradually decreasing in diameter, the uppermost of which was crowned by a colossal statue of the emperor. The terraces themselves were planted with trees. From traces of something of the kind that yet remain, it is conjectured that there was originally an advanced portico attached to the building in the same manner as that of the Pantheon, though considerably smaller in proportion to the rest of the plan, as it could not have been carried up higher than the first stage of the building. According to Hirt's representation of it, in his 'Baukunst bei den Alten,' it was a Corinthian hexastyle, advanced one intercolumn before the side-walls connecting it with the circular edifice behind it.

Hadrian's mausoleum, now converted into the Castello di St. Angelo, in which shape it is familiar to almost every one, is a work of most massive construction, and originally presented an unbroken circular mass of building, erected upon a larger square basement, lofty in itself, yet of moderate height in proportion to the superstructure, the latter being about twice as high as the former. This nearly solid rotunda, which was originally coated with white marble, had on its summit numerous fine statues, which were broken to pieces and the fragments hurled down by the soldiers of Belisarius upon the Goths, who attempted to take the building by storm. Neither are any remains now left of the uppermost stage of the edifice, which assumed the form of a circular peripteral temple, whose diameter was about one-third of the larger circle. According to tradition, its peristyle consisted of the twenty-four beautiful marble Corinthian columns which afterwards decorated the basilica of San Paolo fuori delle Mura (partially destroyed some few years ago by fire, but now nearly restored); and its tholus or dome was surmounted by a colossal pine-apple in bronze, now placed in the gardens of the Vatican.

Such places as Henry VII.'s Chapel and the Pantheon of the Escurial may also be considered as mausoleums; but the term is generally restricted to a detached edifice erected merely as a private burying-place or to contain tombs. There are several structures of the kind in the parks of our nobility; among the most remarkable is that at Castle Howard, the seat of the earl of Carlisle, and one of Hawksmoor's best works, a noble circular edifice in the Roman-Doric style, elevated upon a basement, and crowned by a dome: plans, sections, &c., of this structure have been beautifully engraved by Moses. The marquis of Rockingham's mausoleum by Carr is another ornamental structure of the kind, composed of three stories, Doric, Ionic, and Corinthian. We may also mention those at Cobham in Kent, and Brocklesby in Lincolnshire, by the late James Wyatt. The mausoleum of Louisa, queen of Prussia, at Charlottenburg near Berlin, has a Grecian-Doric portico, but is not so remarkable as a building as for containing the sarcophagus on which is the recumbent figure of that princess, the chef d'œuvre of Rauch's chisel.

MAWES, ST. [CORNWALL.]

MAWMOISINE, or MALVOISINE, WILLIAM DE, was bred in France, and has been thought by some to have been a native Frenchman. He afterwards came to Scotland, where he was made one of the *clerici regis*, and archdeacon of St. Andrew's, in which latter capacity he was present at the baptism of Prince Alexander, afterwards King Alexander II. He was made chancellor of Scotland 6 Id. September, 1199, about which time also he was elected bishop of Glasgow, and consecrated the following year by special precept from the pope. (Fordun, viii. 61.) In the year 1202 he was translated to the see of St. Andrew's, when he seems to have resigned the office of chancellor. In September, 1208, he dedicated a new cemetery at Dryburgh Abbey. (2 Chalm., *Caled.*, 339.) He afterwards made a visit to the Continent; and having returned, we find him and the bishop of Glasgow, in 1211, possessed of legatine powers from Rome, and assembling at Perth a great council of the clergy and people, to press upon the nation the pope's will and command that an expedition be undertaken to the Holy Land. (Fordun.) In 1214 he attended the coronation of King Alexander II. (Id., ix. 1), and is said to have set the crown upon the king's head. The next year he went with the bishops of Glasgow and Moray and the mitred abbot of Kelso to the Fourth Lateran Council, where the doctrines of Wycliffe were condemned, and seems to have remained abroad till 1218. From the Continent he brought with him into this country various orders of monks and mendicants, till then unknown here, and had convents of Black Friars erected at Aberdeen, Ayr, Berwick, Edinburgh, Elgin, Inverness, Montrose, Perth, and Stirling, and monasteries for the monks of Valliscaulium at Pluscardine, Beaulieu, and Ardchattan. He wrote lives of the popish saints Ninian and Kentigern. It was to him and in his time that Pope Innocent III. sent the decretal letters which we find in the 'Corpus Juris Canonici' (*Decret.*, Greg., b. iii., tit. 49, c. 6), to the king of Scots, and (b. iii., tit. 24, c. 9; b. iv., tit. 20, c. 6; and b. v., tit. 39, c. 28), to the bishop, archdeacon, and abbot of St. Andrew's, respectively.

But zeal for the church was by no means this prelate's only passion; for we find that on one occasion, noticed by Fordun (viii. 62), he deprived Dunfermline Abbey of the presentation to two churches, because the monks had failed to provide him wine for supper. Fordun adds that the monks had indeed supplied wine; but the bishop's own attendants had drunk it all up. It may be that the name of Malvoisine was originally but a mere soubriquet, from his malmsey bibbing propensity, as if it were 'William of the Malmsey-butt.'

He continued bishop of St. Andrew's till his death (Keith's *Bishops*), which happened on the 9th July, 1238 (3 Chalm., *Caled.*, 616); and he is remembered in a composition respecting tithes, anno 1297 (2 Connell, *On Tithes*, 413).

MAXE'NTIUS, MARCUS AURELIUS VALERIUS, son of Maximianus, the colleague of Diocletian in the empire, was living in obscurity when, after his father's abdication, and the elevation of Constantine to the rank of Cæsar, he became envious of the latter, and dissatisfied with the neglect of Galerius towards him. Accordingly he stirred up a revolt among the prætorian soldiers at Rome, and was proclaimed emperor, A.D. 306. Galerius, who was then in the East, sent orders to Severus Cæsar, who had the command of Italy, to march from Milan to Rome with all his forces, and put down the insurrection. In the mean time Maximianus, who lived in retirement in Campania, came to Rome, and was proclaimed emperor as colleague with his son, A.D. 307. Severus, on arriving with his troops near Rome, was deserted by most of his officers and soldiers, who had formerly served under Maximianus, and were still attached to their old general. Upon this he retired to Ravenna, which he soon after surrendered to Maximianus, on being promised his life and liberty; but Maximianus put him to death. Maximianus proceeded to Gaul to form an alliance with Constantinus, leaving Maxentius at Rome. Galerius soon after arrived in Italy with an army; but not finding himself strong enough to attack Maxentius in Rome, and fearing the same fate as that of Severus, he made a precipitate retreat. Maximianus, returning to Rome, reigned for some months together with his son, but afterwards quarrelled with him, and took refuge with Galerius, who acknowledged him as emperor. There were then no less than six emperors, Galerius, Maximianus, Constantinus, Maxentius, Licinius, and Maximinus Daza. In the following year, 309, Maxentius was proclaimed consul at Rome, together with his son, M. Aurelius Romulus, who in the next year was accidentally drowned in the Tiber. Maxentius possessed Italy and Africa; but Africa revolted, and the soldiers proclaimed as emperor an adventurer of the name of Alexander, who reigned at Carthage for three years. In the year 311 Maxentius sent an expedition to Africa, defeated and killed Alexander, and burnt Carthage. Proud of this success, for which he had the honour of a triumph, Maxentius made great preparations to attack Constantine, with whom he had till then preserved the appearance of friendship. Constantine moved from Gaul into Italy, advanced to Rome, and defeated Maxentius, who was drowned in attempting to swim his horse across the Tiber, A.D. 312. [CONSTANTINUS, FLAVIUS VALERIUS.]




Coin of Maxentius.
British Museum. Actual Size. Gold.




Coin of Licinius.
British Museum. Actual Size.




Coin of Licinius Junior.
British Museum. Actual Size.

MA'XIMA AND MI'NIMA. These Latin words, which simply mean 'greatest' and 'least,' are used to imply, not the absolute greatest and least values of a varying quantity, but the values which it has at the moment when it ceases to increase and begins to decrease, or vice versâ. Thus if it be said that the height of the barometer was a maximum at ten o'clock, it means that up to that hour the barometer rose, and then began to fall; in which case it would still be said to have been a maximum, even though it should afterwards rise, and stand at a greater height than at ten o'clock. Thus it is possible that there should be several maxima and minima in one day, and even that one of the minima should be greater than one of the maxima: that is, at one moment when the fall ceases and a rise begins, the barometer may then be higher than it was at another time when a rise had ceased and a fall begun.

The theory of maxima and minima is, mathematically speaking, very simple. It is obvious, from the definition of a differential coefficient, that if y be a function of x, and if x be increasing, then when y also increases, $\frac{dy}{dx}$ is positive; and when y diminishes, $\frac{dy}{dx}$ is negative. If the words increase and diminution have their full algebraical sense, this proposition is true whatever the sign of y may be. It follows that when increase ceases and diminution begins, $\frac{dy}{dx}$ changes from positive to negative, and when diminution ceases and increase begins, it changes from negative to positive. But as a quantity cannot change its sign without becoming either nothing or infinite; it follows, first, that y can only be a maximum when x has such a value that $\frac{dy}{dx}$ is nothing or infinite; secondly, that there is not then a maximum unless the latter changes from positive to negative, when x increases through that value; nor a minimum

unless the same differential coefficient changes from negative to positive, in the same case.

Thus when $y = a + x - x^2$, the differential coefficient of which is $1 - 2x$, we see that the latter changes sign when x changes from less than $\frac{1}{2}$ to greater than $\frac{1}{2}$; and the change of sign is from positive to negative. There is therefore a maximum when $x = \frac{1}{2}$, and this maximum is $a + \frac{1}{2} - \frac{1}{4}$, or $a + \frac{1}{4}$.

When $\frac{dy}{dx} = 0$ (which is by far the most common case), and there is a maximum, it changes sign from + to −, or diminishes, algebraically speaking: therefore $\frac{d^2y}{dx^2}$ is negative. Similarly, when $\frac{dy}{dx} = 0$, and there is a minimum, $\frac{d^2y}{dx^2}$ is positive. But when $\frac{dy}{dx}$ is infinite, and there is a maximum or minimum, this additional rule does not apply.

Works on the differential calculus give the development of this theory and examples. We shall only here add one of the rules for determining the maximum or minimum when there are two distinct variables.

When z is a function both of x and y, two variables independent of one another, there may be a maximum or minimum when $\frac{dz}{dx}$ and $\frac{dz}{dy}$ are both nothing, both infinite, or one nothing and the other infinite. When they are both nothing, which is the only case in which this theory is of any practical application, it must be determined as follows, whether there is any maximum or minimum, and which it is. Find the values of x and y which make $\frac{dz}{dx} = 0$, $\frac{dz}{dy} = 0$, and with any pair of these values find the value of the expression

$$\left(\frac{d^2z}{dx\,dy}\right)^2 - \frac{d^2z}{dx^2} \cdot \frac{d^2z}{dy^2}.$$

If this be negative, or nothing, there is a maximum or minimum; if it be positive, there is a mixture of the two which can only be satisfactorily explained by illustrations drawn from the theory of curved surfaces. When the expression is negative or nothing, there is a maximum if $\frac{d^2z}{dx^2}$ and $\frac{d^2z}{dy^2}$ be both negative, and a minimum if they be both positive.

The usual method of establishing all the preceding formulæ, namely, by the application of Taylor's theorem, applies only to the cases in which the differential coefficients become nothing, and not to that in which they become infinite. It is also frequently stated that there is always a maximum or minimum where a differential coefficient vanishes, which is not true.

MAXIMIA'NUS, MARCUS VALERIUS, a native of Pannonia, born of obscure parents, served in the Roman armies with distinction, and was named by Diocletian his colleague in the empire, A.D. 286. The remainder of his life is given under DIOCLETIAN, CONSTANTINE, and MAXENTIUS. He was put to death at Marseille, by order of Constantine, for having conspired against his life, A.D. 310.



Coins of Maximianus.
British Museum. Actual size.

MAXIMIA'NUS, GALE'RIUS VALE'RIUS, was surnamed Armentarius, on account of having been a herdsman in his youth. The events of his life are narrated under DIOCLETIAN, CONSTANTIUS I., and CONSTANTINUS. According to the historians, he died (A.D. 311) of a loathsome disease, which was considered by his contemporaries and himself as a punishment from heaven for his persecution of the Christians.



Coin of Galerius Valerius Maximianus
British Museum. Actual Size.

MAXIMILIAN. [HABSBURG, HOUSE OF.]

MAXIMI'NUS, CAIUS JULIUS VERUS, was originally a Thracian shepherd. He was of gigantic size and great bodily strength. He entered the Roman army under Septimius Severus, and was rapidly advanced for his bravery. Alexander Severus gave him the command of a new legion raised in Pannonia, at the head of which he followed Alexander in his campaign against the Germans, when the army being encamped on the banks of the Rhine, he conspired against his sovereign, and induced some of his companions to murder him in his tent, as well as his mother Mammæa, A.D. 235.

Maximinus, being proclaimed emperor, named his son, also called Maximinus, Cæsar and his colleague in the empire. He continued the war against the Germans, and devastated a large tract of country beyond the Rhine, after which he repaired to Illyricum to fight the Dacians and Sarmatians. But his cruelty and rapacity roused enemies against him in various parts of the empire. The province of Africa revolted, and proclaimed Gordianus, who was soon after acknowledged by the senate and the people of Rome, A.D. 237.

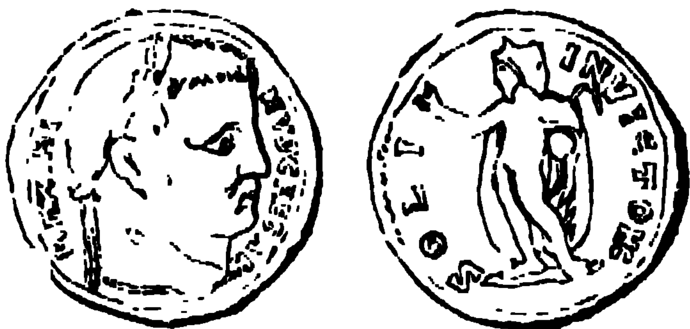
But Capellianus, governor of Mauritania for Maximinus, defeated Gordianus and his son, who fell in the struggle, after a nominal reign of little more than a month. [GORDIANUS, MARCUS ANTONIUS AFRICANUS.] Rome was in consternation at the news, expecting the vengeance of Maximinus. The senate proclaimed emperors Clodius Pupienus Maximus and Decimus Cælius Balbinus, but the people insisted upon a nephew of the younger Gordianus, a boy twelve years of age, being associated with them. Maximus marched out of Rome with troops to oppose Maximinus, who had crossed the Isonzo and laid siege to Aquileia. Maximinus experienced a brave resistance from the garrison and people of that city, which excited still more his natural cruelty, and the soldiers, being weary of him, mutinied, and killed both him and his son, A.D. 238. Maximinus the father, then sixty-five years old, was a ferocious soldier and nothing else, and wonderful tales are related of his voracity, and the quantity of food and drink that he swallowed daily. His son is said to have been a handsome but arrogant youth. (Capitolinus, in *Historia Augusta.*)



Coin of Maximinus.
British Museum. Actual Size. Copper.

MAXIMI'NUS, DAIA, or DAZA, an Illyrian peasant, served in the Roman armies, and was raised by Galerius, who was his relative, to the rank of military tribune, and lastly to the dignity of Cæsar, A.D. 303, at the time of the abdication of Dioclotian and Maximianus, when he had for his

share the government of Syria and Egypt. After the death of Galerius, A.D. 311, Maximinus and Licinius divided his dominions between them, and Maximinus obtained the whole of the Asiatic provinces. Both he and Licinius behaved ungratefully towards the family of Galerius, their common benefactor. Valeria, the daughter of Diocletian and widow of Galerius, having escaped from Licinius into the dominions of Maximinus, the latter offered to marry her, and on her refusal banished her with her mother into the deserts of Syria. He persecuted the Christians and made war against the Armenians. A new war having broken out between Licinius and Maximinus, the latter advanced as far as Adrianople, but was defeated, fled into Asia, and died of poison at Tarsus, A.D. 313.



Coin of Maximinus.
British Museum. Actual Size.

MA'XIMUS, CLODIUS PUPIENUS. [BALBINUS.]
MAXIMUS PLANU'DES. [PLANUDES.]
MA'XIMUS MAGNUS. [GRATIAN; THEODOSIUS.]



Coin of Maximus Magnus.
British Museum. Actual Size. Gold.

MA'XIMUS TY'RIUS, a rhetorician and Platonic philosopher, lived in the latter half of the second century, during the reigns of the Antonines and of Commodus. He resided principally at Athens, but sometimes visited Rome: he does not seem to be the same person as the stoic Claudius Maximus, who was one of the philosophical friends of the emperor M. Aurelius, though some critics have been of this opinion. (*Life of Aurelius*, by J. Capitolinus, c. 3.)

There are extant forty-one dissertations (διαλέξεις or λόγοι) of Maximus Tyrius on various points connected with the Platonic philosophy, which are written in an easy and pleasing style, and more commendable for the expression than the matter. The following examples will give some idea of the subject of these dissertations:—'On Plato's opinion respecting the Deity;' 'Whether we ought to return Injuries done to us;' 'Whether an Active or a Contemplative Life is to be preferred;' 'Whether Soldiers or Husbandmen are more useful in a State;' 'On the Dæmonium of Socrates;' 'Whether Prayers should be addressed to the Deity,' &c.

The best editions of Maximus Tyrius are by Stephanus, Paris, 1557; by Heinsius, Leyden, 1607, 1614, reprinted at Oxford, 1677; by Davis, Cambridge, 1703, reprinted at London with notes by Markland, 1740. The dissertations have been translated into French by Morel, Paris, 1607, by Forney, 1764, and by Dounais, 1802; into Italian by Petro de Bardi, Venice, 1642; and into German by C. T. Damm, Berlin, 1764. There is, we believe, no English translation of this author.

There were several other antient writers of the name of Maximus, of whom the most celebrated was Maximus of Ephesus, who initiated Julian into the Eleusinian mysteries, and had subsequently great influence in the councils of that emperor.

MA'XIMUS, THE GREEK, a celebrated personage in Russian church history, was a native of Arta in Albania, where he was born towards the end of the fifteenth century. After studying at Paris, Florence, and other cities then distinguished as seats of learning, he entered the cloister of Mount Athos, where he took the monastic vows; but the grand-duke Vassili Ivanovitch, having desired the patriarch of Constantinople to send two persons to arrange and describe a vast number of Greek manuscripts and books that had recently been discovered in some part of the palace, the choice fell upon Maximus for one of them. He accordingly set out for Moscow, and was astonished to meet with such a prodigious store of Greek literature. He was directed by Vassili to examine the books, and to select such as were most deserving of translation; but as he was then wholly ignorant of the Slavonic tongue, he had first to prepare a Latin version, which was afterwards rendered by others into Slavonian. It was thus that the translations of a Psalter with a commentary, and Chrysostom's 'Homilies on St. John,' were produced. Desirous of returning to his convent, it was only at the instances of the Tzar, who wished him to revise the earlier translated books of the Greek church, that he remained and undertook that task, for which he was then qualified by having obtained in the interim a competent knowledge of Slavonian. The diligence with which he executed it tended however only to raise up numerous enemies against him, among the rest Daniel, the metropolitan; for the corrections he deemed it requisite to make were so numerous as to give great offence to the more zealous. What more immediately tended to his disgrace was the firmness with which he opposed Vassili's divorce from his first wife Salome (on account of barrenness), and his marriage with the princess Helena Glinski. He was condemned by a synod, excommunicated as a heretic, and imprisoned in the Otrotch monastery at Tver, in 1525; in this confinement he was treated with great rigour till the death of the metropolitan Daniel; after which the bishop of Tver interceded for him and obtained some mitigation of the severity used towards him. At length the next Tzar, Ivan Vassilivitch, consented to his being removed to the monastery of St. Sergius, where he continued until his death in 1556. A great number of works are extant by him (chiefly in manuscript) on a variety of subjects, dogmatical, polemical, philosophical, &c.; from which considerable information has been derived with regard to the opinions and prejudices of the clergy and people in that age; nor was he at all timid in reproving the abuses and vices of the times. This alone would account for the persecution which he drew down upon himself; but after his death even those who had been among the more violent against him, admitted his innocence, nor was it long before his memory came to be regarded as that of a holy man and a martyr.

MAXWELL, ROBERT, LORD, son of John, third Lord Maxwell, who was killed at Flodden, in September, 1514. He had been knighted, and appointed Stewart of Annandale, on the resignation of his father, on the 10th of June preceding; and in 1517 he was appointed warden of the West Marches. In 1524 he was provost of Edinburgh, and in that capacity chosen one of the lords of articles for the commissioners of boroughs: a solitary instance, it is supposed, of a peer being so elected. He was afterwards chosen one of the privy-council; and on the 17th of November, 1533, appears in the sederunts of the Court of Session as an extraordinary lord of session. In 1536 he was appointed one of the lords of the regency to whom the government of the kingdom was entrusted during the absence of King James V. on his matrimonial expedition to France; and the next year he was himself despatched to negotiate the marriage of Mary of Lorraine. He is said to have advised the expedition which terminated at Solway Moss, but was so incensed at the command of the army being given to Oliver Sinclair, that in common with most of the Scots nobility he mutinied and yielded himself up a prisoner to the English, who had a force much inferior to their opponents. On the death of King James V. he was ransomed and allowed to return to Scotland, in the hope that he would further the projects of King Henry VIII., in reference to the marriage of the young queen of Scots. In the first parliament of Mary, which met in March, 1543, he presented to the lords of articles one of the most important acts of the time, which had undoubtedly considerable effect in accelerating the progress of the Reformation. This was a writing, or as we should now term it, a *Bill*, for an act of parliament to allow the reading of the Scriptures in the vulgar tongue. The lords of articles found the proposal reasonable; and it was accordingly brought into parliament, and passed into a law notwithstanding the protest and opposition of the lord chancellor and the whole hierarchy of the kingdom. Towards the end of the same year, Beaton became chancellor, and Lord Maxwell was apprehended, but he contrived to make his escape almost immediately after. He died on the 9th of July, 1546.

MAY, the fifth month of our present year, was the second in the old Alban calendar, the third in that of Romulus,

and the fifth in the calendar of Numa Pompilius. In the Alban calendar it consisted of twenty-two days; of thirty-one in the calendar of Romulus; and of thirty in that of Numa. Julius Cæsar restored to it the odd day of which Numa had deprived it, and of which it still keeps possession. Its etymology is doubtful. Ovid, in the fifth book of his 'Fasti,' proposes three derivations: one from *majestas;* another from *majores*, a term which signified the *patres*, or governing body of the city of Romulus; and the third from *Maia*. The Roman month was under the protection of Apollo; and on account of the celebration of the Lemuria, marriages undertaken during its course were considered ill-omened. (Ovid, *Fasti*, v. 483-490.)

Our Saxon ancestors, after the Romans, called it *Maius-month;* and, in their native language, *Tri-milchi*, three-milk month, when cows were milked three times a day.

MAY-DAY and MAYING. It was antiently the custom, observes Brand, for all ranks of people to go out a-maying early on the first of May. Bourne (*Antiq. Vulg.*, ch. xxv.) tells us that, in his time, in the villages in the north of England, the juvenile part of both sexes were wont to rise a little after midnight on the morning of that day, and walk to some neighbouring wood, accompanied with music and the blowing of horns, where they broke down branches from the trees, and adorned them with nosegays and crowns of flowers. This done, they returned homeward with their booty about the time of sunrise, and made their doors and windows triumph in the flowery spoil.

There was a time when this custom was observed by noble and royal personages as well as the vulgar. Chaucer, in his 'Court of Love,' says that early on May-day, 'Fourth goth al the court, both most and lest, to fetche the flowris fresch, and braunch, and blome.'

It is on record that King Henry VIII. and Queen Katherine partook of this diversion; and historians also mention that he, with his courtiers, in the beginning of his reign, rose on May-day very early to fetch May or green boughs; and they went, with their bows and arrows, shooting to the wood. Shakspere ('Henry VIII.,' act v., scene 3) says, it was impossible to make the people sleep on May morning; and ('Mids. Night's Dream,' act iv., scene 1) that they rose early to observe the rite of May. The court of King James I. preserved the observance of the day, and it was long continued by the populace, as Spelman's 'Glossary' remarks, under the word 'Maiuma.'

Two or three minor observances still remain to be slightly noticed. The may-pole, decked with garlands, round which the rustics used to dance in this month, yet stands in many of our villages through the whole circle of the year; and chimney-sweepers with their Jack-in-the-green continue to dance in the streets of London. A may-pole formerly stood in the Strand, upon the site of the church by Somerset House, but was taken down in 1717.

Misson, in his 'Travels' (see Ozell's *Translation*, p. 307), notices a custom which has now gone by for forty years. The country girls who served London with milk, accompanied by a fiddler and a garland of plate (hired from a silversmith) adorned with flowers, danced before the doors of their customers.

Most of the rites here enumerated had, no doubt, their origin in the heathen observances practised at this season of the year in honour of Flora, the deity who presided over fruits and flowers. (Hospinian, *De Festis Judæorum et Ethnicorum*, fol. 100.)

Polydore Virgil notices the prevalence of May customs in Italy. An account of some of those observed in France will be found in the 'Mémoires de l'Académie Celtique,' tom. iii., p. 446; and Dr. E. D. Clarke, in his 'Travels,' vol. i., 4to., Cambr., 1810, p. 110, notices the promenades and other observances on the first of May at Moscow, among the sights there most interesting to a stranger. See also Brand's *Popular Antiquities*, 4to. edit., vol. i., p. 179-204.

MAY-WEED (*Anthemis arvensis*), or Wild Chamomile, a troublesome weed in corn, which is difficult to eradicate, as it is propagated both by seed and by the low running branches which strike into the soil and take root. It flowers in May, as its name denotes, and sheds its seed long before the corn is reaped. The only certain mode of extirpating it is by great care in clearing the land when it is fallowed or prepared for turnips, ploughing it in as soon as the flowers appear, and never allowing it to go to seed. In the alternate system it is soon got rid of by the hoeing of the green crops; clover also kills it when the land is in good heart, and in the convertible husbandry it is destroyed while the land is in grass, and mown. It is a sure sign of a slovenly husbandry when the land is covered with May-weed. It often infests farms which have been neglected by outgoing tenants, and it is indispensable to get rid of it before any attempt at improvement is made. A good clean fallow is the surest means of destroying this as well as all other annuals: by repeated harrowings the seeds are first brought to the surface, where they vegetate, and are afterwards destroyed. The time to do this is in dry weather, interspersed with occasional showers, as in the months of April, May, and June.

MAY, THOMAS, an early English dramatist and historian, was born in 1595. He was the son of Sir Thomas May, who was descended from an antient family in the county of Sussex. Having finished his education at Sidney College, Cambridge, he came to London, and made the acquaintance of several persons of distinction.

In 1637 May was opposed to Sir William Davenant as candidate for the office of laureate, which the death of Ben Jonson had left vacant. Sir William was successful, and his success so exasperated May, that although hitherto a courtier, he became hostile to the king's party, and wrote a history in favour of the parliament. In 1650 he was found dead in his bed. It is supposed that he was strangled by the tightness of his nightcap-strings. He was buried in Westminster Abbey, near John Cambden the historian; but his body was taken up after the Restoration, and removed to a large pit in the church-yard of St. Margaret's, Westminster, and his monument in the abbey pulled down.

Besides a history of parliament, he wrote a history of Henry II., and made a translation of Lucan's 'Pharsalia,' with a continuation both in Latin and English. His plays are supposed by some to be five in number, and these five are named 'Agrippina,' 'Antigone,' 'Cleopatra,' 'The Heir,' and 'The Old Couple.' The last two are comedies, and are printed in Dodsley's Collection. Phillips and Winstanley ascribe to him two other plays, called 'The Old Wife's Tale,' and 'Orlando Furioso,' but the dates assigned to the first publication of these pieces, if correct, render the supposition impossible.

MAYBOLE, a parish and market-town in the district of Carrick and county of Ayr. The town is pleasantly situated upon a small eminence surrounded by hills, and its direct distance is about 5 miles from the sea-coast and 70 south-west by west from Edinburgh. It was erected into a burgh of barony by a charter of James V., dated 24 Nov., 1516, but it was not till the commencement of the following century that the burgesses appear to have availed themselves of the privilege thus conferred upon them of electing their own magistrates. The management of the affairs of the burgh is vested in a council, consisting of seventeen members, who hold their office during life. The revenue, derived from landed property and an annual tax called 'stint,' averages 65*l*. per annum, which is about equal to the expenditure. The streets are cleansed and kept in repair at the expense of the turnpike-road trust-fund of the county. None but burgesses can legally carry on any manufacture or trade within the burgh; the charge for admission into their body is 1*l*. 1*s*. or 10*s*. 6*d*., according as the applicant is a stranger or the son of a freeman. There are however no manufacturing establishments, although the chief part of the inhabitants are employed in hand-loom weaving for the Glasgow houses. The principal building is the church: it is large, and surmounted by a steeple in very bad taste. The population of the parish in 1831 was 6287, of which it is estimated that rather more than one-half were resident within the boundary of the burgh. There are in all thirteen schools, and one of these, called the 'subscription school,' is chiefly supported by the Irish inhabitants. There are also a savings' bank and several philanthropic institutions.

In the tavern of the 'Red Lion' is shown the room where Knox, and Kennedy, the abbot of Crossraguel, accompanied by eighty of the nobility and gentry of the country, assembled, the former to impugn the mass, the latter to defend it; and the inhabitants have since 'instituted a "Knox Club," which holds triennial festivals, at which men of all parties meet to testify their gratitude for their deliverance from the domination of Rome, and their secure enjoyment of Protestant principles, achieved for them by Knox and his coadjutors.'

(*New Statistical Account of Scotland; Parliamentary Report on Scotch Burghs*, &c.)

MAYENCE. [MAINZ.]

MAYENNE. (River and Town.) [MAYENNE.]

MAYENNE, a department in the western part of France, bounded on the north by the departments of Manche and Orne, on the east by that of Sarthe, on the south by that of Maine et Loire, and on the west by that of Ille et Vilaine. Its form approximates to that of a parallelogram, having an average length of 50 or 52 miles from north by east to south by west, and an average breadth of 38 miles from east to west. Its area is estimated at 1994 square miles, being below the average area of the French departments, and almost equal to that of the English county of Norfolk. The population in 1831 was 352,586; in 1836 it was 361,765, showing an increase in five years of 9179, or between 2·5 and 3·0 per cent., and giving more than 181 inhabitants to a square mile. In density of population it is above the average of France, but rather below the English county with which in area we have compared it. Laval, the capital, is on the Mayenne, 149 miles in a direct line west-south-west of Paris, or 169 miles by the road through Dreux, Alençon, and Mayenne, in 48° 4′ N. lat., and 0° 48′ W. long.

The northern part of the department is the most elevated. The principal range of the Armorican chain of mountains, and the branch from it which separates the basin of the Loire from that of the Vilaine, skirt the western border, the hills gradually subsiding as they proceed southward. Another branch of the Armorican chain skirts the eastern border, subsiding into the plain sooner than the western branch, to which it is parallel. These two branches enclose the valley watered by the Mayenne and its tributaries. The department is almost entirely occupied by the rocks of earlier formation, being included in the great primitive district of Bretagne. There was in 1834 one coal-mine in the department, giving employment to above a hundred men, and yielding about 5000 tons annually. There were also five mines of anthracite (besides two others not worked), giving employment to more than 350 men, and yielding annually 18,000 tons. Some iron-ore is procured; the number of iron-works in 1834 was five, having eight furnaces for smelting pig-iron and fifteen forges for making bar-iron. Charcoal was the fuel almost exclusively employed. Freestone, slates, and marble are quarried.

The principal river is the Mayenne, which rises just beyond the boundary of the department, near the north-eastern corner, and flows westward (sometimes in this department, sometimes in that of Orne), 22 miles, to the neighbourhood of Lassay; from thence it flows southward 55 miles through the valley described above, to the boundary of the department, 26 miles beyond which it falls into the Loire below Angers. Its whole course is about 103 miles, of which it is navigable for 50 miles, viz. from Laval; 24 miles of the navigation are in this department. The official returns make the total navigation 59 or 60 miles, of which about half is in this department. The feeders of the Mayenne are none of them navigable in this department; the principal are the Varenne, the Colmont, the Ernée, and the Oudon, which join the Mayenne on the right bank, and the Jouanne, which joins on the left. The Erve, which waters the east side of the department, falls into the Sarthe, which just touches the south-east corner. There are many large pools (the chief are in the upper part of the Oudon and the Vicoin, a small feeder of the Mayenne), and many brooks.

The number of Routes Royales, or government roads, in 1837, was five, having an aggregate length of 157 miles, viz. 107 in repair, 44 out of repair, and 6 unfinished. The principal road is that from Paris to Rennes and Brest, which enters the department on the north-east, runs south-west by Pré-en-Pail to Mayenne, and from thence south by west by the valley of the Mayenne to Laval, where it turns off to the west and quits the department. Roads from Laval run southward by the valley of the Mayenne through Château-Gonthier to Angers (Maine et Loire), south-east by Meslay to La Flèche (Sarthe), and eastward to Le Mans (Sarthe). Roads from Mayenne lead northward to Domfront (Orne) and Caen (Calvados), and westward to Fougères and St. Malo (Ille et Vilaine). There are also several departmental roads, having an aggregate length of 178 miles, viz. 109 miles in repair, 17 out of repair, and 52 unfinished. The bye-roads and pathways have an aggregate length of 2500 miles.

About two-thirds of the soil of the department are under the plough. Wheat is not much cultivated; rye, barley, oats, and especially buckwheat, are more commonly raised. The northern part of the department is sterile, the centre of moderate fertility, but the southern part produces abundant harvests. Much hemp and flax are grown, and there are extensive orchards, especially of apple and pear trees, from the fruit of which a great quantity of cider and perry is made. There are few vineyards, and the wine which they produce is of ordinary quality; the department lies almost entirely beyond the line within which the vine can be cultivated to advantage. Among the vegetables cultivated is a gigantic variety of the cabbage, which grows above the height of a man. The pools produce a plant, 'the water chesnut,' the fruit of which, enveloped in a husk, floats on the surface of the water, and has, when roasted, the flavour of a chesnut. Meadows and grass lands, including the heaths and other open pastures, are extensive, occupying from one-fifth to one-sixth of the soil; the number of cattle reared is considerable, especially cows, from whose milk excellent butter is made; there are large flocks of sheep, the wool of which is in good repute; the horses are of small size; swine and poultry are numerous, and a vast number of bees are kept all over the department. The woodlands of the department are not extensive.

The peasantry are simple-minded but ignorant. Education is in a very low state, and superstition is predominant. The inhabitants however are religious, sincere, and honest. They are neither such industrious nor such skilful farmers as those in the neighbouring department of Sarthe, but are more regular and better tenants; buckwheat is still a favourite crop with them; trefoil is very little regarded. In the troubled times of the Revolution this department swarmed with Chouans, or royalist partisans; but on the subsidence of those troubles the peasantry returned to their ordinary pursuits, and at present in no part of France are the roads safer, property more respected, and political excitement less violent.

The department is divided into three arrondissements, as follows:—

	Area in sq. miles.	Population in 1831.	Population in 1836.	Communes.
Laval, central	703	117,534	122,755	92
Mayenne, north	820	162,164	164,618	110
Château-Gonthier, south	471	72,888	74,392	73
	1994	352,586	361,765	275

There are 27 cantons, or districts, each under a justice of the peace.

In the arrondissement of Laval are, Laval (population in 1831, 15,826 town, 16,401 whole commune; in 1836, 17,810 commune), on the Mayenne [LAVAL]; Montsurs, on the Jouanne; Evron (pop. 1846 town, 3759 whole commune), on the Dinard, a feeder of the Jouanne; Sainte-Suzanne, on the Erve; St. Ouen and Loiron, in the country west of the Mayenne; and Meslay, on the road from Laval to La Flèche. Evron is a busy place, with a good weekly market and ten yearly fairs, situated in an excellent wheat district. The town has a tolerably handsome market-house, a Benedictine abbey, now occupied by the Sœurs de la Charité, and a conventual church, with a fine choir. Sainte Suzanne is a small town of about 1000 inhabitants, on a high hill. It was once a place of strength. It has the ruins of an old castle, and some old ramparts yet more in decay, vitrified in one part like the vitrified forts of Scotland. The French writer who describes this remarkable phenomenon (Vaysse de Villiers) contends for its being the effect of lightning; but as the place was occupied by the Northmen, to whom, under the name of Danes, the vitrified forts of Scotland are ascribed, the walls of Sainte-Suzanne may probably be ascribed to them. Meslay is a small place of about 1200 inhabitants, consisting chiefly of one street, well paved and lined with neat well-built houses. The neighbourhood produces abundance of corn.

In the arrondissement of Mayenne are Mayenne, Ambrières, Lassay (population 1676 town, 2897 whole commune), Couptrain, and Pré-en-Pail (pop. 3844 whole commune), on or near the Mayenne; La Poôté (pop. 3281 whole commune); Vilaine or Villaines-la-Juhel (pop. about 1200); and Bays, in the country east of that river; Gorron, on the Colmont; Ernée (pop. 3645 town, 5467 whole commune) on the Ernée; and Fougerolles, Landivy, Mantaudin, and St. Denis, in the north-west corner of the department. Mayenne is situated on the slope of two hills which face each

other, and are separated by the river Mayenne. The town, properly so called, is on the right bank, where the hill is highest; the part on the left bank is a suburb which contains about one-third of the whole population of the place; the two are connected by a bridge. The principal line of street is that which descends one hill, crosses the bridge, and ascends the other; this constitutes the road from Paris to Rennes by Fougères; the more frequented road by Laval just passes through the eastern extremity of the suburb. This principal street is neither wide nor straight, and the slope on the side of the town is so steep that in summer it requires a team of twelve, and in winter sometimes of thirty horses and oxen to draw up heavily laden carriages. Near the summit of the hill the street widens so as to form a place or opening divided by a modern town-hall into two parts, one of which is adorned by a fountain. At the summit of the hill on a slate rock is the antient castle of the dukes of Mayenne, at present occupied as the town prison. The linen-hall or market is separated from this castle by a terrace planted with trees and used as a promenade. The town and suburb have each a parish church. The houses are mostly antient, but the streets are very clean. The population of Mayenne in 1831 was 8758 for the town and suburb, or 9797 for the whole commune; in 1836 it was 9782 for the commune. The principal manufactures are of linens, calicoes, and handkerchiefs. There are three weekly markets: one for linen, cattle, and general commodities; another for corn, and a third for provisions: there are eight yearly fairs. The linen manufacture, which is the staple, is carried on not only in the town but in the surrounding districts, and employs 8000 persons; the raw material is chiefly foreign flax. There are, two or three miles west of the town, at Fontaine Daniel, a calico manufactory employing 500 persons; and about the same distance south, the wrought-iron forges of Aron. The town has a subordinate court of justice, an hospital, and a high school. Lassay has handsome market-houses and an antient château. Much business in cattle and in flax is done at its weekly market and its two yearly fairs. Pré, or Prez-en-Pail, has a considerable weekly cattle-market. Ernée is laid out with tolerable regularity, and is pretty well built. It is the residence of several wealthy families who occupy handsome houses; it has a large market-place, in which is an antient market-house. The town has no manufacture, and the district round it is purely agricultural.

In the arrondissement of Château Gonthier are, Château-Gonthier (pop. of the commune in 1831, 6143, and in 1836, 6226) on the Mayenne [CHATEAU-GONTHIER]; Baillé on the Erve; Grez-en-Bouère and St. Denis, in the country east of the Mayenne; and Craon (pop. 2550 town, 3610 whole commune) and Cossé-le-Vivien, on or near the Oudon. Craon has narrow and crooked streets, and plainly built houses. The market-house is large. The chief trade of the place is in flax. There is good society at Craon; Volney was a native of this place. Cossé-le-Vivien with 1000 to 1200 inhabitants, is situated in a fertile district, and is the seat of a considerable trade in linens.

The chief manufacture of the department is that of linen, including sail-cloth and table-linen. Flax spinning and weaving form the occupation of a large portion of the working class in the arrondissement of Mayenne, the sterile soil of which affords little encouragement to agriculture; but the rate of wages is low, and the intervals of depression to which manufactures are liable occasionally throw the work-people into great distress. Laval and Mayenne are the chief seats of this manufacture; but the population of the arrondissement of Laval is more agricultural than that of Mayenne. The decline of the linen manufacture, induced by the extended use of cotton fabrics, has led to the introduction of the manufacture of calicoes and cotton handkerchiefs into both those towns. Some woollen stuffs and paper are also made. These manufactures, with wood for fuel and for building ships, iron, marble, slates, and various articles of agricultural produce, constitute the chief articles of export.

The department is comprehended, with that of Sarthe, in the diocese of Le Mans; the bishop of which is a suffragan of the archbishop of Tours. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Angers; and is comprehended in the fourth military division, of which the head-quarters are at Tours. It sends five members to the Chamber of Deputies.

This department was comprehended, in the most antient historic period, in the territory of the Diablintes, the Arvii, and the Andes or Andecavi, three Celtic nations, which under the Roman domination were comprehended in the province of Lugdunensis Tertia. The antient name of the river Mayenne in a Romanized form was Meduana. Næodunum (afterwards Diablintes) and Vagoritum, the respective chief towns of the Diablintes and the Arvii, were within the limits of the department. Of the first, now the village of Jublins, there are important remains. There are the walls of a Roman station forming nearly a square of 600 or 700 feet each way, with towers on the sides and at the corners. The walls are scarcely more than seven or eight feet high, and about nine feet thick; composed of layers of square stone, alternating with three tiers of brick, and the whole united by a very hard cement. It is one of the most firmly built and best preserved Roman forts in France. Within the enclosure are the traces of buildings probably occupied by the garrison of the fort. A subterraneous apartment was discovered near the fort about seventy years ago, but covered up again to stop the troublesome visits of the curious. It had a mosaic floor and painted walls. An antient well has also been discovered, and medals and rings have been dug up. There is at Jublins a granitic rock presenting a resemblance to a chair, supposed to be a Druidic monument. It is popularly called 'the Devil's chair.' There are some remains of a town supposed to be Vagoritum, now called Arve, or Erve, on the river Erve. From this name it has been inferred with great probability that the town, like the other chief towns in Gaul, took at a later period the name of the people to whom it belonged. The first syllable of the name Vagoritum appears to be preserved in that of the Vaige, a small stream flowing parallel to the Erve, about a mile or two from it. In the middle ages the department was comprehended chiefly in the province of Maine, but a small part of it in that of Anjou. [ANJOU; MAINE.] This part of France suffered much in the Vendéan war.

MAYER, TOBIAS, was born at Marbach, a town of Wurtemberg, on the 17th of February, 1723. His father was a civil engineer, and held the appointment of inspector of the water-works (inspecteur des eaux) at Esslingen. From him young Mayer received some elementary instruction in the mathematics, but it could not have been much, since we read that he was left an orphan and unprovided for at a very early age. To gain a livelihood he began teaching the mathematics, and at the age of twenty he studied the principles of gunnery, probably with a view of entering the army. In the year 1746 he took an active part in the establishment of the Cosmographical Society of Nürnberg, to whose Transactions he afterwards contributed several interesting memoirs. Among these is one, published in 1750, 'On the Libration of the Moon,' in which, besides treating the subject in a very able manner, he then for the first time employed 'equations of condition,' which are now of such extensive and important application. [CONDITION.] In 1751 he became director of the observatory at Göttingen, and at the same time or subsequently was appointed professor of economy in that university, which appointment was probably a sinecure, since it does not appear that he ever taught any subject but the mathematics and their application. At Göttingen, during the remainder of a very short life, he laboured with the most praiseworthy zeal to promote the sciences of geography, navigation, and astronomy. His 'Zodiacal Catalogue' was 'deserving of all confidence' (Delambre), and comprised 998 stars, including those whose correct positions are of most importance to the astronomer. In 1755 he published his 'Lunar Tables' in the 'Acts of the Academy of Göttingen,' and a copy of them was forwarded to the London Board of Longitude. By order of the board the accuracy of the tables was rigorously tested by Dr. Bradley, who was able in no instance to detect an error greater than 1′ 30″ (the error of the other tables then existing sometimes amounted to 10′), and even part of this he was of opinion might be fairly attributed to his own observations. (See Dr. Bradley's *Letter to the Secretary of the Admiralty*, dated 10th February, 1756.) These tables were printed by the Board of Longitude in the year 1767, and likewise the 'Solar Tables' by the same author in the year 1770. After the death of Mayer the British parliament, at the recommendation of the Board, paid his widow the sum of 3000*l*. The original resolution of the Board, dated 9th of February, 1765, recommends that a sum 'not exceeding 5000*l*.' should be awarded; and Delambre states that a further sum of 2000*l*. was subsequently paid; but this

is a mistake. The act of parliament awarding the 3000*l.* is that of 5 Geo. III., c. 20; and the later acts relating to the Board of Longitude make no further mention of Mayer's widow. To Mayer is also due the discovery of the principle of the repeating circle, which was afterwards so fully developed by Borda, and employed by him in the measurement of the arc of the meridian. [BORDA; REPEATING CIRCLE.] Mayer died at Göttingen on the 20th of February, 1762. His éloge was spoken by Kaestner (Gött., 4to., 1762). In 1801 a simple monument was erected to his memory at Göttingen, the place of his interment.

The following list of his published works is given by M. Delambre from the 'Eloge' of Mayer by Kaestner:—'Description of a new Globe of the Moon' (Nürnberg, 1750); 'Terrestrial Refractions;' 'Geographical Maps;' 'Description of a new Micrometer;' 'Observations of the Solar Eclipse of 1748;' 'Conjunctions of the Moon and Stars observed in 1747-8;' 'Proofs that the Moon has no Atmosphere;' 'Motion of the Earth explained by a Change in the Direction of Gravity;' 'Determination of the Latitude of Nürnberg, with other Astronomical Observations;' 'Memoir on the Parallax of the Moon, and upon the Distance of that Satellite from the Earth, as deduced from the Length of the second Pendulum;' 'On the Transformation of Rectilinear Figures into Triangles;' 'Inclination and Declination of the Magnetic Needle, as deduced from Theory;' 'On the Inequalities of Jupiter.' In addition to the above there appeared at Göttingen, in 1775, in folio, edited by George Lichtenberg, his successor at the observatory of Göttingen, the first volume of what was intended to be a complete edition of Mayer's works. This, which is the only volume that has been published, consists of six memoirs entitled, 1, 'A Method of determining more correctly the Variations of the Thermometer: a Formula for determining the mean Temperature of different Latitudes, and the Period of the Year corresponding to the greatest Intensity of Heat and Cold;' 2, 'Observations made with his mural Quadrant of six feet radius;' 3, 'An easy Method of calculating the Eclipses of the Sun;' 4, 'A Memoir on the Affinity of Colours,' wherein he recognises but three primitive colours; 5, his 'New Catalogue of Stars;' 6, 'A List of Eighty Stars,' in which he believed he had detected a motion, in addition to that resulting from the precession of the equinoxes.

('Notice of the Life of Mayer,' by M. Delambre, in the *Biog. Univ.*; Hutton's *Mathematical Dictionary*; and Montucla, *Hist. des Math.*)

MAYNOOTH. [KILDARE.]

MAYO, a maritime county of the province of Connaught, in Ireland, bounded on the east by the counties of Sligo (from which it is separated by the river Moy) and Roscommon, on the south by the county of Galway, and on the west and north by the Atlantic Ocean. According to the ordnance map of Ireland, constructed for the Irish railway commissioners in 1836, it lies between 53° 27′ and 54° 19′ N. lat., and between 8° 31′ and 9° 20′ W. long., and extends from Achil Head on the west to the junction of the Sligo and Roscommon boundaries at Ballaghadereen on the east, 72 statute miles, and from the centre of Loch Corrib on the south to Downpatrick Head on the north, 58 miles. The length of the coast-line from the mouth of the river Moy on the north-east to the head of the Killery Harbour on the south-west, exclusive of the minor indentations of the shore, is about 250 statute miles. The area, as ascertained by the ordnance survey, has not yet been made public. According to the map constructed under the superintendence of the Society for the Diffusion of Useful Knowledge, it contains 1,023,273 English acres, or 1598 square statute miles. According to Mr. Griffith's estimate, it consists of

Cultivated land	871,984	statute acres.
Unprofitable bog and mountain	425,124	„
Water	57,940	„
Total	1,355,048	statute acres,

or 2117 square statute miles, being next to Cork and Galway, the third largest county in Ireland. In 1831 the population was 367,956.

Mayo has a very diversified surface, embracing a part of the great inland plain which extends across the centre of the island, together with a large extent of wild and mountainous country interposed between the western verge of that plain and the sea. The mountain region consists of two principal districts, separated from one another by Clew Bay, a capacious inlet of the Atlantic, which, running inland to a distance of fifteen miles, by from seven to eight miles in width, meets the western extremity of the plain at Westport. The mountain groups lying south of Clew Bay cover the entire barony of Murrisk, and stretch beyond the bounds of the county into the highlands of Joyce Country and Connemara. [GALWAY.] The area which they cover within the limits of Mayo is about fifteen miles by twenty, and is bounded on the north by the level land about Westport and by Clew Bay, on the west by the Atlantic Ocean, on the south by the long narrow inlet of the great Killery Harbour and the Joyce Country mountains, and on the east by the flat country constituting the basin of lochs Mask and Carra. The most easterly of the various mountain groups comprised within these limits is constituted by the Furmnamore and Partry Mountains, which, extending in a north-easterly direction from the head of the Killery, form a continuous range of fifteen miles in length, rising abruptly over the western shores of the above-mentioned lakes. The elevation of Furmnamore, rising about midway between the Killery Harbour and Loch Mask, is 2210 feet. The other chief summits of the range are Bengorriff, near its southern extremity, 2038 feet, and Slieve Bohaun, terminating it on the north, 1294 feet.

On both sides of the chain are bold ravines, traversed by streams descending on the one hand into Loch Mask, and on the other into the valley of the Owen Errive river, which runs southward into the head of Killery Harbour, and also into the valley of the Ayle. The Ayle, running northward through the first part of its course, dips underground immediately on emerging from the mountain district, and, passing eastward round the terminus of the range for two miles under the limestone-rock of the plain, rises again and flows southward, along the opposite side of the mountain, into the head of Loch Mask. One of the sources of the Owen Errive is the Lake of Glenawagh, which lies in what is locally termed a *prison*, being a bowl-shaped hollow in the northern side of Furmnamore, surrounded by perpendicular precipices 1500 feet high. West of the valley of the Owen Errive lies the group of Muilrea, skirting the northern shore of the Killery, and extending inland in a direction generally parallel to that of the range of Slieve Partry. Muilrea Mountain, which rises immediately over the northern entrance to the harbour, is the highest ground in the county, being 2682 feet in altitude. Next in the range, eastward, is Benberry, 2610 feet; between which and Bengorm, 2224 feet, lie the romantic lakes of Doologh and Delphi, with the shooting-lodge of the Marquis of Sligo. These heights, as they trend eastward, are broken into numerous lateral valleys, of which the most considerable is Glen Lawr, watered by the main branch of the Owen Errive. Above Glen Laur the highest point of the range is 2429 feet. Northward from the immediate group of Muilrea the centre of the district of Murrisk rises into undulating hills of from 900 to 1200 feet in height, the general slope of the country being towards the north-west, in which direction most of the streams rising in the interior make their way through openings in the hilly country to the sea. The northern verge of Murrisk, bordering on Clew Bay, is occupied through a length of ten miles by the range of Croagh Patrick, running parallel to the shore. Croagh Patrick, locally called the Reek, rises immediately from the water's edge in the centre of the range to an altitude of 2510 feet, presenting a very perfect conical outline on every side, and forming by much the most conspicuous feature in the surrounding scenery. The general character of this district is sterile, though among the undulating hills of the central part there are extensive tracts of coarse pasture. The only place having the character of anything more than a hamlet throughout the entire tract is the little village of Louisburg, near the coast on the north-west.

The mountainous district lying north of Clew Bay is of considerably greater area, extending upwards of forty miles from east to west, by thirty miles from north to south. Separated from the range of the Ox mountains in Sligo by the valley of the Moy and the low basin of Loch Conn, thus standing insulated in the north-western part of the county, it nevertheless corresponds, in the direction of its principal groups, both with the range above mentioned on the east, and with that of the Slieve Partry mountains on the south. The Croagh Moyle mountains, forming the most advanced group towards the plain, appear as a continuation of the Sligo highlands, running in a direction from north-east to

south-west, from the valley of the Moy to the head of Clew Bay at Newport. The highest point of this range is 1655 feet. Corresponding in direction with the Croagh Moyle range is the group of Nephin, which extends from Loch Fyough, near the northern shore of Clew Bay, at a distance of about five miles from the exterior range, to the western shore of Loch Conn. The chief summits of this range, commencing from the west, are, Buckorgh, 1922 feet, Bercen Curragh, 2295 feet, and Nephin, 2646 feet; the last, being the highest ground in this district, forms an object of great grandeur, rising abruptly over the western verge of Loch Conn. In the intermediate valley bounded by these ranges, which constitutes the principal pass northwards from Newport, lie Loch Beltra, the waters of which run south-westward to Clew Bay at Newport, and Loch Lavalla, which discharges itself north-eastward into Loch Conn, the latter lying within the mountain-pass of Barn-na-gee. Northward from the range of Nephin lies a vast tract of comparatively level but extremely desolate moorlands, bounded towards the east by the fertile valley of the Moy, and westward by the nearly semicircular amphitheatre of the Tyrawley and Nephin Beg mountains. A subordinate and nearly parallel ridge of low elevation divides this tract into two portions, the waters of one of which flow eastward by the Deel river to Loch Conn, and those of the other, passing through a gap in the centre of the range, run westward by the Owenmore river to the head of Blacksod Bay. The altitude of that part of the chain north of this gap is from 900 to 1200 feet; south of the valley of the Owenmore the heights are loftier and of a more striking outline, being broken into lateral valleys and defiles, and containing many small lakes surrounded by striking precipices. The chief heights here are Slieve Cor, 2368 feet, Nephin Beg, 2012 feet, and Cushcamcurragh, 2262 feet; the last rises immediately over the shore of Clew Bay, from which point the range takes a westerly direction, occupying the entire promontory of Corraun Achil, and beyond it, rising again into very bold eminences throughout the large island of Achil, which is separated from the mainland by a very narrow sound running up between Clew Bay and Blacksod Harbour. The surface of Achil Island is extremely mountainous, and its shores are perhaps more precipitous than any equal extent of coast in the British islands. At Minaun, on the south side of the island, the cliffs, which are slightly overhanging, have an altitude of 1000 feet and upwards; and at Keem Head, which terminates the island westward, the whole side of the mountain, which appears to have been rent asunder by some convulsion of nature, constitutes one shelving precipice of 2222 feet, springing immediately from the water's edge. The island is of a triangular shape, the northern and eastern sides being fourteen and twelve miles in length respectively, and the base, which faces the offing of Clew Bay towards the south-west, being fifteen miles in length. The northern side of the island constitutes the southern boundary of Blacksod Bay, a great arm of the Atlantic included between the wild district of Erris, which stretches westward from the chain of the Nephin Beg mountains on one side, and the low peninsula of the Mullet on the other. The Mullet, extending fifteen miles in length, is connected with the mainland of Erris by an isthmus five miles long by one mile on an average in breadth, which separates the head of Blacksod Bay from the head of the Bay of Broadhaven, included between the Mullet and the mainland in a similar manner on the north. The thriving little town of Belmullet is situated on the narrowest part of the isthmus, where it is only 400 yards wide. The peninsula is better tilled and less desolate than the mainland; there is a considerable village on it, called Binghamstown, near the head of Blacksod Bay; and Major Bingham, the chief proprietor, has a permanent residence farther south. The southern part of the peninsula is low and sandy, but the surface is varied on the north by some inconsiderable eminences, of which Slieve More, 432 feet in height, rising over the western entrance to Broadhaven, is the chief. From its comparatively level surface and the facilities for procuring sea-weed and sand for manure, this remote district possesses great capabilities of improvement; but the immense tract of bog and mountain interposed between it and the market-towns of the interior has hitherto been a great obstacle to traffic. Nevertheless the town of Belmullet, which has sprung up since 1826, now consists of two streets of slated houses and a neat square, and has a yearly increasing export of grain. During the period of railway speculation in Ireland, a few years ago, Belmullet was much spoken of as the terminus of a great western railway, by which it was proposed to open the vast desolate tract lying between it and the valley of the Moy, but the design has not been encouraged. Nothing can exceed the bleakness and sterility of the entire tract lying between the shores of Blacksod and Broadhaven bays and the valley of the Moy. On the western side of the Tyrawley and Nephin Beg chain are numerous lakes, of which the greatest is Loch Carrowmore, five miles in length, which discharges its waters by the Owenmore river, famous for its salmon, into Tullaghan Bay, an arm of Blacksod Harbour. Between Tullaghan Bay and the Nephin Beg mountains lies the district of Ballycroy, where some herds of the red deer still survive. This part of Mayo has recently become pretty well known, as the scene of an interesting work entitled 'Wild Sports of the West.'

The remainder of the country, consisting almost wholly of open undulating plains, is divided by a low range of eminences running south of Castlebar into two principal districts, the waters of one of which run northward by the Moy to the sea at Killalla, and those of the other southward to lochs Mask and Corrib, and so to the sea at Galway. The district immediately surrounding Westport, the waters of which run westward to Clew Bay, is comparatively of inconsiderable extent. The valley of the Moy from the sea to Foxford, which is situated fifteen miles above the mouth of the river, is open, and contains much improved and improvable land, especially in the neighbourhood of Killalla [KILLALLA] and Ballina. Ballina, the third town in the county, about six miles above the æstuary of the Moy, is situated partly in the county of Mayo and partly in the county of Sligo, the portion on the right bank of the river, which is within the latter county, being called Ardnaree. Ballina is of recent origin, there having been no town here prior to 1729, when Lord Tyrawley gave the first impulse to industry in this district by the establishment of a cotton factory. The prosperity of the town has however been mainly owing to the enterprise of various traders who have been induced to settle here since the beginning of the present century in consequence of the local facilities for carrying on the grain and provision trades. In the vicinity of the town are numerous seats of resident gentry. Between Ballina and the range of Nephin is Loch Conn, a fine sheet of water eight miles in length by from one to four in breadth, communicating on the south, by a very narrow strait in the neck of land called the Puntoon, with Loch Cullin, a sheet of smaller dimensions, through which it discharges its waters into the river Moy close to Foxford.

The little town of Crossmolina, on the high road from Ballina to Belmullet, stands at the head of Loch Conn, and is surrounded by a tolerably fertile tract of country. The valley at Foxford is contracted by the approaching ranges of the Croagh Moyle and Slieve Gamph mountains, the latter constituting the western extremity of the Sligo group. Southward from this point the features of the valley are lost in the wide extended plain which opens inland. The hill of Slieve Carnon, rising to a height of 855 feet, is the only considerable eminence in this district. Running nearly north and south, it separates the vale of Castlebar on the west from the open tract spreading eastward into Roscommon, the former being watered by streams terminating in Loch Cullin, and the latter by the numerous and widely extended feeders of the Moy. The main stream of the Moy, rising in the county of Sligo, runs westward through an open upland valley bounded on the north by the line of the Ox mountains, and on the south by low undulating hills of from 600 to 700 feet in height, skirting the northern verge of the great plain. This vale is thinly inhabited, and much encumbered with mountain bogs; towards its western extremity however, near the point where the Moy, after receiving its tributaries from the southern plain, turns northwards, there is a good deal of cultivation round the small town of Swineford. Southward from the low range mentioned as bounding the valley of the upper Moy the country is more thickly inhabited and more productive. Under these eminences on the eastern verge of the county is the small town of Ballaghadereen. The immediately surrounding district is bleak and swampy, but the bogs disappear on travelling westward and southward into the pastoral tract extending from the Roscommon border on the east, to the vicinity of Castlebar on the west, and from the

Slieve Carnon on the north to the borders of Galway on the south. This tract, embracing a very large extent of country, is named generally the Plains of Mayo, though the locality to which the name strictly applies is confined to the rich grazing lands immediately south of Slieve Carnon. The small town of Ballyhaunis is situated on the eastern verge of these plains, Claremorris near the centre, Hollymount on the south, and Ballyglass and Balla on the west. In the neighbourhood of the four last towns are numerous seats of resident nobility and gentry, among which Castlemacgarret, the residence of Lord Oranmore, near Claremorris, is the most conspicuous. The tracts of bog are also more numerous here than in the northern and central portion of the plain, occupying most of the valleys, and in several instances insulating the demesnes of the gentry. The country nevertheless, from the closeness of the demesnes and the quantity of timber, particularly about Hollymount and Ballyglass, has a rich appearance, which is considerably heightened by the vicinity of lochs Mask and Carra on the west, and by the extended mountain background on the west and north. South from Loch Carra and Hollymount an open fertile district extends along the eastern shore of Loch Mask, stretching inland without any incumbrance of unprofitable land as far as the border of Galway. This tract contains numerous private seats, and the small towns of Ballinrobe, situated on the river Robe near the point where it enters Loch Mask; Cong, situated on the narrow neck of land dividing Loch Mask from Loch Corrib; and Shrule, a poor village on the Galway border near Headford. The structure of the isthmus on which Cong is situated is very remarkable, the entire waters of lochs Mask and Carra passing by a subterraneous channel, which can in some places be approached by natural caves in the limestone rock at a depth of forty feet from the surface, to the lower basin of Loch Corrib. The scenery in this neighbourhood is very striking from the extent of water on all sides, and the grand mountain boundaries rising immediately over the western shores of both lakes.

The district surrounding the head of Clew Bay contains the towns of Westport and Newport, the former situated on a small stream running into the south-eastern angle of the bay, and the latter on the river which discharges the waters of Loch Beltra into its north-eastern angle. Westport is a well built and handsome town; two of the principal streets run parallel to the river, the borders of which are laid out as a public walk, with rows of trees. Westport House, the residence of the marquis of Sligo, by much the finest mansion in the county, stands in the immediate vicinity of the town, between it and the sea. From Westport to Newport the head of Clew Bay is studded over with green pasturable islands, varying in size from a few acres to half a mile in length, and in number amounting to 170. The shore along the head of the bay is also good arable and pasture land, and is worn into numerous peninsulas and low promontories, many of them wooded, which greatly increases the picturesque effect. On one of these promontories is the residence of Sir Samuel O'Malley, Bart., a considerable proprietor; and at Newport also, close to the shore, is the seat of Sir Richard O'Donel, another owner of large tracts in the neighbourhood. The whole scenery of this district is remarkably striking; the beauty of the head of Clew Bay, with its labyrinth of islands, in particular, would appear to have been generally known from an early period, as they are distinguished as 'the Fortunate Islands,' in an Italian map of the sixteenth century.

The only harbour generally frequented on the northern coast is that of Killalla, formed by the embouchure of the river Moy. The bay is a square of about five miles each way, with a range of sandhills extending across the bottom. In this range there are two openings, one forming the bar of the Moy, and the other that of Killalla harbour. Formerly vessels for Ballina entered by the Killalla bar, and sailed by the lagoon at the back of the sandhills to the pool of Moyne, where they discharged by lighters; but since the execution of some improvements in the Moy a few years since, the navigation has been direct; and vessels of 200 tons now sail up to within a mile of Ballina. From Killalla bay westward the coast for a distance of twenty miles rises in lofty cliffs, affording very little shelter for craft of any kind. There are coves at Balderig, Port Terlin, and Port-a-cloy, where yawls can be kept, but these places, being open to the north and in immediate connection with the main sea, are always exposed to a heavy ground-swell. The last, which is a narrow inlet bounded by steep cliffs of several hundred feet in height on both sides, has a depth of twenty-four fathoms at its mouth, and four fathoms close in-shore. This ironbound coast continues to Benwee Head, between which and the north-eastern extremity of the Mullet is the entrance to Broadhaven. This bay consists of an outer and an inner harbour, the entrance to the latter being somewhat less than half a mile in width, in four fathoms water. The landlocked basin within runs up seven miles to Belmullet, and affords good anchorage throughout. The only use to which this fine harbour has been turned is the protection of a few row-boats employed in the fishery. The western shore of the Mullet has no shelter for vessels of burthen further than that afforded in western gales by an open anchorage under the lee of the Inniskea islands in the offing. The shores of the great bay of Blacksod Harbour afford numerous excellent roadsteads and several sheltered spots well adapted for landing cargoes. Of these the principal are Tarmon harbour, Elly harbour, and Salleen harbour, on the shore of the peninsula; Belmullet and Cleggan, at the head of the bay; and Tallaghan bay and the sound of Achil, on the shore of the mainland. The side of Achil facing the offing of Clew Bay is mostly a cliff with no shelter for any larger craft than boats, which may be drawn up on the beach in one or two coves. The southern shore of Corraun Achil is also for the most part ironbound. Neither is there any good shelter on the opposite coast of Murrisk bounding the lower part of Clew Bay on the south; but the upper end abounds with a multitude of safe and excellent anchorages, among the numerous islands between the creeks of Newport and Westport. The mouth of the bay also being covered for one-third of its breadth by Clare Island, the whole basin enjoys a considerable shelter from the prevalent run of the sea. The remainder of the coast of Murrisk between Clew Bay and the Killery possesses no harbours, but there is anchorage in westerly winds in four fathoms water under the lee of Innisturk Island in the offing. Innisbofin, another island constituting part of this county, although lying more off the coast of Galway, possesses a tolerable harbour, which was esteemed of such importance in the time of the Commonwealth as to be made the site of a small blockhouse, the ruins of which still remain. The Killery harbour has been described under the head GALWAY. Small piers have been constructed from time to time, at costs varying from 100*l.* to 2000*l.*, at Killalla, Belmullet, Salleen, Tarmon, Bullsmouth, Achil Sound, Clare Island, Oldhead, Innisturk, and Bundurra.

The only navigable river in the county is the Moy. An extended system of inland navigation has been proposed [CONNAUGHT], but, as yet, there are no canals within the county.

In no part of Ireland has the want of good roads been more felt, or have their advantages been more fully exhibited than in Mayo. In 1802 there was no road whatever passable for wheel-carriages in winter through western Tyrawley and the entire of Erris, a tract equal in area to many of the inland counties, and the district about Ballina was very ill supplied with means of communication. Roads have now been constructed, partly by government and partly by grand jury assessments, through both these districts, the chief lines being from Castlebar to Belmullet through the centre of Tyrawley, and from Killalla and Ballina eastward by Swineford towards the terminus of the Royal Canal. Other good roads, from Castlebar to Ballina by the Pontoon, and from Ballina by Crossmolina to Belmullet, have also been recently constructed. The district of Murrisk has also been opened by a new and excellent road from Westport to the head of the Killery harbour, where it joins the line of government road through Connemara. The western parts of Murrisk are still unprovided with sufficient means of communication, and part of the district lying along the base of the Slieve Partry mountains next to Loch Mask is altogether impassable for carriages. The champaign part of the county is in general well opened, the principal line of road being that which leads from Westport and Castlebar through Hollymount towards Tuam.

From the vicinity of the Atlantic and the quantity of wet surface exposed, the climate of the western districts is damp and ungenial. The level part of the country, having the protection of so great a barrier of mountain in the direction of the prevalent winds, and lying open towards the east and south, enjoys a climate as mild as most of the midland counties. From the remains of submarine forests on the

coast and the quantities of bog-timber found on the sides of the most exposed mountains in Murrisk and Erris, it would appear that trees formerly flourished throughout the western district, where it is found very difficult at present to rear plantations even in the most sheltered spots.

Geology.—The geological structure of Mayo resembles, in its general features, that of Galway, exhibiting an arrangement of primary and secondary rocks skirting a limestone basin. As usual, the champaign district and the field of limestone are co-extensive, the primary and secondary formations being confined to Erris and western Tyrawley on the north, and to Murrisk on the south. It has been remarked that in many of the western bays of Ireland the rock which forms the bed or bottom of the bay consists of the flœtz limestone, while the projecting promontories situated to the north and south of each are composed of primary or transition rocks. This observation is strikingly illustrated in Clew Bay, where the sea reaches to the verge of the limestone plain between lofty promontories of primary rock on each side, the structure of the bottom of the bay being manifested by a multitude of limestone islands rising round its upper extremity. The eskers which occur throughout the limestone plain near Westport exhibit traces of a current setting towards Clew Bay. Near Loch Conn and Killalla they indicate a current running northward in the line of the Moy. The verges of the plain are, as is usual in similarly situated districts, traversed by numerous subterraneous channels, remarkable instances of which occur at Cong, and in the courses of the rivers Ayle and Owendaff, the latter of which has a subterranean course of two miles near Shrule, where it forms the county boundary. The Mullinmore also, a stream descending from Nephin, runs underground for about three miles.

The southern half of Murrisk, embracing the Furmnamore, Partry, and Muilrea groups, belongs to the grauwacke series; towards the plain in the valley of the Ayle, a tract of yellow sandstone lies between the clay-slate of this formation and the flœtz limestone. Patches of limestone also occur in some places in this valley. The northern division of Murrisk consists mainly of mica-slate with protrusions of granite and quartz, bordered along the north-western coast towards Clew Bay by a tract of old red sandstone, which rises again on the southern and eastern side of the opposite island of Clare, overlying the granite of which the nucleus of that island consists. Of the quartz protrusions in the mica-slate field of northern Murrisk, the chief is the peak of Croagh Patrick. The exterior ranges of the northern mountain district consist chiefly of old red sandstone interposed between the mica-slate of the primary field of Tyrawley and Erris and the flœtz limestone of the champaign. This tract evidently belongs to the same formation which shows itself in the north-west of Murrisk and in Clare Island. It constitutes the southern portion of Corraun Achil, a portion of the range of Nephin Bay, and the entire group of Croagh Moyle, from which, sweeping northward between the base of Great Nephin and Loch Conn, it forms the boundary between the mica-slate field and the limestone of the valley of the Moy throughout the whole extent of Tyrawley. The mica-slate field, as it stretches northward, recedes, and near the coast constitutes but a small portion of the district about Broadhaven. The limestone tract has a corresponding extension in that direction, occupying the greater part of north-eastern Tyrawley, but nowhere reaching to the sea, from which it is separated by an extensive field of yellow sandstone and conglomerate reaching from the north-east of Erris to Killalla. Throughout the great mica-slate field, comprising all Erris, the Mullet, the island of Achil, and southern Tyrawley as far eastward as great Nephin, granite and quartz protrusions are of frequent occurrence, generally constituting the loftiest and most striking elevations of the different mountain-chains. Granite again rises on the opposite side of the valley of the Moy in the Slieve Gamph mountains over Foxford, supporting flanks of mica-slate as in the opposite range of Nephin. Throughout the primary district iron-ore is abundant, and bloomeries have been worked near Tullaghan bay and in the valley of the Deel, but are now given up from want of fuel. Indications of coal are said to have been observed in Slieve Carnon, and deposits of manganese occur near Westport, but at present there are no mining operations carried on in this county beyond the quarrying of slates. Marble susceptible of a good polish has been raised in several parts of the barony of Murrisk.

Soil, &c.—The soils of the champaign tract are in general similar to those of other limestone districts: the best lie about Balla, Claremorris, and Hollymount on the south, and round Ballina on the north. Towards the Sligo and Roscommon borders the soil is light and moory; it is light also throughout the greater part of the tract bordering on Galway, but of a deep and rich quality near Cong and along the eastern shore of Loch Mask.

The tillage lands in the immediate neighbourhood of Westport have been for the most part reclaimed from a comparatively moory state; but more northward towards Newport the soil is naturally sweet, and produces large crops of the best oats. Throughout both mountain districts, north and south of Clew Bay, cultivation only occurs in detached patches. In Murrisk however and Tyrawley are good tracts of upland pasture which answer well for the breeding of young cattle, though not equal to the fattening of stock. The common fence throughout the north and west of the county is the dry stone-wall, or in the moory parts sod-ditches. In the central district and towards the borders of Galway sod-ditches and quickset-hedges are general, but wherever stones can be easily had, dry walls are preferred by the country farmers. The following table exhibits the sales of grain in the principal market-towns in the under-mentioned years. The oats grown in Mayo are of a superior quality, but the wheat is in general inferior to that of Galway:—

	Wheat. (tons.)		Oats. (tons)		Barley. (tons.)	
	1826.	1835.	1826.	1835.	1826.	1835.
Newport	..	12	1,283	1,000	76	275
Castlebar	..	..	688	1,426	50	76
Claremorris	..	..	1,800	2,000	..	..
Ballaghadereen	..	..	..	407	..	..
Ballyhaunis	..	..	..	445	..	..
Ballinrobe	..	1709	..	..	..	153
Westport	600	1400	13,000	15,720	400	100
Ballina	..	23	3,688	7,609	193	142
Killalla	..	..	5,100	3,218	250	315

The coast fishery, which might be rendered very productive, gave occasional occupation, in 1836, to 3768 fishermen. The craft employed consisted of 4 half-decked vessels, 12 open sail-boats, and 677 row-boats. The principal fishing-bank on the north lies between Downpatrick Head and Broadhaven, at about 3 miles from the shore, in 30 to 45 fathoms water, where turbot, sole, cod, ling, haddock, and hake are taken. Between the Stags of Broadhaven (insular rocks in the offing of that bay) and the island of South Inniskea is another bank, in 18 to 30 fathoms water, on which the same fish abound. From 40 to 50 miles due west of Achil Head some fish are taken [GALWAY]; but this fishery, requiring vessels of a better sort than are here in use, has been almost wholly abandoned. Blacksod Bay and Clew Bay also contain extensive fishing-banks for turbot, sole, plaice, &c., and vast quantities of oysters and lobsters may be taken on the shores of both. The herring-fishery is chiefly prosecuted, in the season, near the mouth of the great Killery harbour.

The principal river fisheries in the county are those of the Moy, Ballycroy, and Newport rivers. The salmon-fishery on the first lets for 1500*l.* per annum; the others are preserved by the proprietors. In the Newport river salmon are in perfect order all the year round.

The condition of the labouring classes is somewhat better in the remote and thinly-inhabited tracts than in the plain. From 6*d.* to 8*d.* a day for 100 working days in the year is the average rate of wages in most parts of the county; but in some districts the working days do not average more than 30 in the year. There is much wretchedness among the peasantry of the north-eastern parts of the county; and although the people of the mountainous western districts, in years of ordinary productiveness, are rather better provided with the necessaries of life than the residents on the plain, they have occasionally, especially in Erris and Achil, been reduced to an extremity of distress scarcely ever experienced in any other part of Ireland, by failures in their crops.

There is a large number of resident gentry: of the nobility, the marquis of Sligo and Lord Oranmore are the only residents.

The manufacture of linens is carried on to a considerable extent by the country people: the cloth is generally sold green by the small manufacturers, and bleached in other counties. At Belclare near Westport are factories on a large scale for linen and cotton fabrics. There is also throughout the county the usual home manufacture of friezes and coarse woollens. In 1831 there were in Mayo 16 bleachers, 10 reed-makers, 1730 weavers, 5 brewers, 11 corn-dealers, 8 tobacconists, 3 maltsters, 58 millers, and 154 coopers.

Mayo is divided into the baronies of *Erris* (half barony) on the north-west, containing only hamlets and villages: *Tyrawley* on the north, containing the towns of Ballina, population (independent of the portion in Sligo) 5510; Killalla, pop. 1125; and Crossmolina, pop. 1481: *Gallen* on the north-east, containing the towns of Foxford, pop. 1068, and Swineford, pop. 813: *Castello* on the east, containing the town of Ballaghaderéen, pop. 1147: *Clanmorris* on the south-east, containing the town of Claremorris, pop. 1476: *Kilmaine* on the south, containing the town of Ballinrobe, pop. 2604, and the village of Shrule, pop. 507: *Carra* in the centre, containing the town of Castlebar [Castlebar], pop. 6373, and village of Minola, pop. 450: *Murrisk* on the south-west, containing the town of Westport, pop. 4448: and *Burrishoole* on the west, containing the town of Newport, pop. 1235.

Castlebar is the only corporate town in the county: its charter bears date the 11th of James I. The corporation is now extinct.

Westport is a place of considerable commercial activity. The exports of corn, meal, provisions, and other agricultural produce, in 1836, amounted to 11,800 tons, of the value of 87,805*l.*; the imports in the same year, consisting principally of coals, iron, sugar, flax-seed, tallow, and salt, amounted to the value of 28,517*l.*

Ballina has also a large and increasing trade in agricultural produce. The exports in 1836 amounted to nearly 9000 tons of corn and meal and 500 tons of provisions, of a value, including a small export of kelp, hides, and feathers, of 70,568*l.* The imports in the same year were to the value of 13,532*l.*

The exports from Newport in the same year amounted to the value of 2289*l.*, and consisted wholly of corn. There do not appear to have been any imports. In the same year the exports from Belmullet amounted to the value of 2940*l.*

Prior to the Union Mayo was represented by four members, two for the county and two for the borough of Castlebar. The representation is now limited to the two county members. In 1837 the constituency consisted of 1350 voters. The assizes are held at Castlebar; and quarter-sessions at Castlebar, Westport, Ballina, Claremorris, and Ballinrobe. On January 1, 1836, the police force of the county consisted of 7 chief constables of the first class, 2 second-class ditto, 46 constables, 203 subconstables, and 15 horse, the cost of maintaining which establishment amounted, for the year 1835, to 10,142*l.* 13*s.* 1*d.*, of which 4853*l.* 16*s.* 4*d.* was chargeable against the county. The total number of prisoners charged with criminal offences who were committed to the county gaol in the year 1836 was 1115, of whom 1002 were males and 153 were females. Of these 230 males and 11 females could read and write at the time of their committal, 306 males and 42 females could read only, 437 males and 85 females could neither read nor write, and of the remainder the instruction could not be ascertained. The district lunatic asylum is at Ballinasloe, in the county of Galway. The county infirmary is at Castlebar, and there are dispensaries in all the towns and large villages. In 1836 there were four newspapers published in this county, to which 50,925 stamps were issued during that year. There are seven barracks in the county, affording accommodation for 1200 men, but they are only partially occupied at present.

Population.

Date.	How ascertained.	Houses.	Families.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort .	27,970	..	..	..	..	..	..	140,000
1813	Under Act of 1812 . .	43,702	..	..	..	..	..	..	237,371
1821	Under Act 55 Geo. III., c. 120	53,051	56,026	..	..	..	146,137	146,975	293,112
1831	Under Act 1 Will. IV., c. 19 .	62,367	65,207	52,688	4,895	7,644	179,595	186,733	366,328

History, &c.—This county formed part of the grant made by King Henry II. to William Fitz-Adelm de Burgho about the year 1180. It would appear that the new possessor had very soon made a permanent settlement, as in the 24th year of the reign of King Henry III., the then king of Connaught made a journey to England to complain of the invasion of his territory by the family of the Burkes. The lord-justice of Ireland was on that occasion commanded to 'root out that unjust plantation, which Hubert, earl of Kent, had, in the time of his greatness, planted in those parts;' but the command was never acted on, Richard de Burgho having obtained a new grant of all Connaught after the death of O'Connor, the then king. There is very little known of the subsequent proceedings of the settlers until the period of the great rebellion succeeding the assassination of William de Burgho, earl of Ulster, in A.D. 1333. [Belfast.] About this time Mayo was a county, as appears by a roll of the 49th Edward III., preserved in the chancery of Ireland. It fell away however from all subjection to the English law immediately after the murder of the earl; for some of the younger branches of the Burke family, seeing that the entire province of Connaught would be inherited by his infant daughter (who afterwards married Lionel, duke of Clarence, and so gave the crown its title to the inheritance in the person of Henry VII.), seized upon the counties of Galway and Mayo, and, to avoid the consequences of their usurpation, not only cast off all allegiance to the English law, but renounced their English names and habits, identifying themselves and their followers in all respects with the native Irish. The name chosen by Edmund de Burgho, who seized on Mayo, was MacWilliam *Oughter*, or MacWilliam 'the farther,' to distinguish his family from that of MacWilliam *Eighter*, or 'the hither,' who had in like manner usurped Galway.

All the followers of the family in the county followed his example. The D'Exesters, or D'Exons, took the name of MacJordan; the Nangles, or family of De Angulo, took that of MacCostello; and of the inferior families of the De Burghos, some took the names of MacHubbard, MacDavid, MacPhilben, &c. From this time till the reign of Queen Elizabeth the MacWilliam of the day continued to exercise the authority of an independent potentate. Many families from Galway and Ulster put themselves under the protection of the successive chiefs, and it is probably to this period that the first introduction of many of the most prevalent names at present in the county—Blake, Brown, Kirwan, Macdonnell, &c.—is to be referred. The first step towards a return to English law and manners was made in 1575, when the then MacWilliam, accompanied by the O'Malley and a number of the clan Donnell, came to Galway and made his submission, consenting to pay 250 marks per annum for his country, and to allow his followers to hold by English tenures. This chieftain is described by Sir Henry Sidney, who received his submission, as unable to speak English, though conversing fluently in Latin. The county was shortly after again declared shire ground. The Burkes however soon began to repine under the new government, and, after many complaints, broke into rebellion, in which they were joined by the clan Donnells, Joyces, and other families in the south of the county. To appease these tumults Sir Richard Bingham marched to Ballinrobe on the 12th July, 1586, and having razed several castles of the Burkes and Macdonnells, and given the rebels, who had been joined by a body of 2000 Scottish islesmen, a

signal defeat at Ardnaree, on the Moy, succeeded in restoring the county to tranquillity. The old families of Mayo, in general, took part in the rebellion of 1641 and the succeeding wars, and very extensive forfeitures were the consequence. The forfeitures consequent on the war of the Revolution extended to 19,294 acres, of an estimated total value, at that time, of 37,598*l.* 3*s.* The families of Burke, Browne, and Dillon were those chiefly affected. During these troubles however Mayo was not the scene of any military operations of importance; the only memorable event of that kind, since the battle of Ardnaree, being the invasion, by the French, under General Humbert, in 1798. The invading force consisted of 1100 rank and file only; but such was the alarm caused by their unexpected descent, that they easily carried the towns of Killalla and Ballina; and, being joined by a large body of the peasantry, defeated General Lake, at the head of 6000 men, before the town of Castlebar. [CASTLEBAR.] The surrender of the invading force at Ballinamuck however soon restored tranquillity. [LEITRIM.]

The antiquities of the county are chiefly ecclesiastical. There are round towers at Killalla, Turlogh, Meelick, and Balla. At Cong are the remains of a splendid abbey, originally founded in the seventh century, and re-edified by O'Connor in the twelfth. An archiepiscopal crozier of surprisingly beautiful workmanship, made by command of Turlogh O'Connor, the father of Roderick, the last native king of Ireland, and preserved at Cong until very recently, is now in the possession of the Royal Irish Academy. At Ballyhaunis are the ruins of a largely endowed abbey founded by the family of Nangle. Very fine remains of a Franciscan friary at Moyne, founded by William de Burgho, are still standing. Rosserk abbey, in the same neighbourhood, built by the Joyces in the fifteenth century, is another very striking ruin. Rathbran, also near the Moy, but of which all traces have now disappeared, was a foundation of the Jordans, the remains of whose castles are very numerous throughout the barony of Gallen. The remains of Ballintubber abbey, seven miles from Ballinrobe, are among the most elegant specimens of early architecture in Ireland. It was founded by Cathal O'Connor about the latter end of the twelfth century. Numerous other remains of religious houses founded by the families of De Burgh, O'Malley, and Nangle, throughout the county, are enumerated.

The military antiquities are not in general of much extent or interest. Carrig-a-Nile, near Newport, is said to have been a stronghold of Grace O'Malley, a daughter of that MacWilliam who submitted in 1575, still commonly known in Ireland by the name of Giana Naile, and celebrated for her exploits against the English, especially by sea. Doona Castle, on the shore of Tullaghan bay, was another seat of the O'Malleys, and is still a place of considerable extent: so also is Inver Castle, on the shore of Broadhaven, which probably belonged to the same family. On a detached rock, near Downpatrick Head, are the remarkable ruins of Doonbriste, or 'Broken Castle,' so called from certain remains of an antient building on the cliff, corresponding exactly with other ruins situated on the summit of a detached rock, standing in the sea about 300 yards off, which is hence inferred to have parted from the mainland in some convulsion of nature. None of the other feudal remains are worth notice.

The county expenses are defrayed by grand jury presentments. The amount levied in 1835 was 27,051*l.* 14*s* 7½*d.*, of which 6003*l.* 14*s.* 1½*d.* was for repayment of government loans, 5565*l.* 7*s.* 9*d.* for police, 9457*l.* 9*s.* 6½*d.* for public institutions, and salaries, &c., and 6025*l.* 3*s.* 2½*d.* for the construction and repair of roads and bridges.

(*Statistical Survey of Mayo*, Dublin, 1802; Frazer's *Guide through Ireland*, Dublin, 1838; *Second Report of Railway Commissioners for Ireland*; Cox's *History of Ireland*; *Parliamentary Reports and Papers*.)

MAYOR. [BOROUGHS OF ENGLAND AND WALES.]

MAYOW. [CHEMISTRY.]

MAYPU. [CHILE.]

MAZANDERAN. [PERSIA.]

MAZARIN, Cardinal. [ANNE OF AUSTRIA; LOUIS XIV.]

MAZEPPA, Hetman (that is, commander-in-chief) of the Cossacks of the Ukraine, has become celebrated by a poem of Lord Byron, which has for its subject his extraordinary adventure. He was the son of a Polish gentleman in Podolia, and served for some time as a page at the court of King John Casimir (who reigned 1648—1668), where he acquired some education. On his return to his native province he carried on an intrigue with the wife of one of his neighbours. Being surprised by the offended husband, he was bound by his orders, according to the current story, to one of those wild horses which roam in a half savage state about the Ukraine, and the animal was turned loose. The frightened horse ran with his unwilling burden, till it reached the country of the Cossacks, where Mazeppa, who was in a senseless state, was released from his dangerous position. Being restored to health by the kind treatment of the Cossacks, he entered into their service, and rose by degrees to the rank of their supreme commander. This romantic story of the horse seems scarcely credible, and one might reasonably doubt if a man could escape with his life under such circumstances. The point has at last been settled in a satisfactory manner by the contemporary memoirs of Passek, which were lately published in Polish. According to that author, Mazeppa was bound by the offended husband to the same horse on which he had come to pay his addresses to the wife. The horse, being let loose, carried its master back to his own house, and the shame which Mazeppa felt at having been exposed in such a manner induced him to leave his native land and retire among the Cossacks. Whatever may have been the reasons which induced Mazeppa to take that step, he soon distinguished himself by his bodily strength, great courage, natural abilities, and some acquirements, so that he became general-adjutant and secretary of Hetman Samoilowich, and after his death in 1687 was chosen to fill his place.

The Cossacks of the Ukraine, who were organised by King Stephen Battory (who died in 1586), rebelled against Poland in 1648, and being unable to maintain themselves as an independent nation, they submitted to the czar of Muscovy in 1654, on condition that all their liberties and privileges should be preserved. But the Muscovites soon began to encroach on their liberties, and attempted to convert the Ukraine into a province and govern it like the other parts of their empire. Mazeppa, who was much in favour with Peter the Great, to whom he had rendered many eminent services, was strongly attached to the liberties of his adopted country, and is said to have made strong but useless representations against their violation. The victories of Charles XII. of Sweden induced Mazeppa, notwithstanding his great age, for he was then about seventy, to enter into a negotiation with him for the independence of the Ukraine, which Charles promised to establish if Mazeppa would join him with his forces. The negotiation was discovered by two colonels of the Cossack army, named Iskra and Koczubey, who reported it to Peter the Great. Peter was however so confident in Mazeppa's fidelity, that he gave up both the colonels as calumniators to Mazeppa, who ordered them to be beheaded.

According to his agreement with Mazeppa, Charles turned from the high road to Moscow, which he was pursuing, to the south, in order to join Mazeppa and spend the winter in the rich Ukraine, but the disasters which befell his army on a march during the severe winter of 1708-9 reduced it to a wretched condition; whilst the designs of Mazeppa being discovered, his capital, Baturin, was taken, after a desperate resistance, by the troops of Peter, and Mazeppa, being deserted by his army, joined Charles with an inconsiderable force. After the battle of Pultava he retired with Charles to the Turkish territory, where he died soon after.

MAZZUOLI. [PARMIGIANO.]

MEACO, or KIO. [JAPAN.]

MEAD, RICHARD, M.D., was born near London in 1675, and after studying in some of the most celebrated of the continental schools, took the degree of Doctor of Medicine at Padua in 1695. On his return to England, obtaining considerable reputation in his practice, he was appointed in 1703 physician to St. Thomas's Hospital, and in 1711 anatomical lecturer at Surgeons' Hall. He was also elected a Fellow of the Royal College of Physicians, and was physician to George II. On the death of his chief patron, the celebrated Dr. Radcliffe, Mead became the most renowned physician of the day, and was obliged to relinquish all his public offices. He employed the greater part of the wealth which he obtained from his practice, in the patronage of science and literature, and in collecting pictures, and a very valuable library, of which he bequeathed the greater part to the College of Physicians. He died in 1754.

Mead's principal works are, 'A Mechanical Account of

Poisons,' London, 1702; 'De imperio sôlis et lunæ in corpora humana, et morbis inde oriundis,' 1704; 'A short Discourse concerning Pestilential Contagion,' 1720, which was written at the request of the secretary of state, in reference to the contagious nature of the plague then raging at Marseille, for the prevention of which Mead recommended the most rigorous measures of quarantine and disinfection. Some papers on Grecian coins struck in honour of physicians, from which he inferred many interesting facts in the history of medicine, and on which he had a long discussion with Dr. Conyers Middleton. 'On the Scurvy,' 1749; this was published as an appendix to the account of the method of ventilating the holds of ships then lately invented by Sutton. 'On Small-pox and Measles,' 1748; containing a full account of inoculation, of which he had witnessed the first experiments in this country on some condemned prisoners. 'Medicina Sacra, seu de Morbis insignioribus qui in Bibliis memorantur,' 1748; 'Monita et Præcepta Medica,' 1751, containing a general summary of his medical experience. All these works, both individually and collectively, passed through several editions in this country, as well as in Germany, France, and Italy.

(*Authentic Memoirs of the Life of Richard Mead*, by Matthew Maty, M.D., 8vo., London, 1755.)

MEADOW SAFFRON. [COLCHICUM.]

MEADOWS are properly low grounds on the banks of rivers, which, being kept moist by their situation, and also occasionally flooded by the rise of the waters, are best adapted for the growth of grass, and are generally mown for hay. Some meadows of great extent, belonging to a community or district, in which every inhabitant has a right to send his cattle to graze, under certain regulations, are never mown.

When the number of those who have a right of common pasture is not very great, they frequently agree among themselves to abstain from depasturing the meadows in spring, and, dividing them into portions, each makes hay of his share; after which the cattle are admitted in common for the remainder of the season. Thus a common meadow is converted into a *Lammas meadow*, that is, a meadow which becomes a common pasture after the 1st of August, this being the time when it is supposed that all the hay has been made and secured.

When meadows are private property they become much more valuable. The flooding is encouraged or prevented, according to circumstances, and in many cases artificial irrigation is adopted. [IRRIGATION.] If they are exposed to be too often inundated, they are protected by dams and sluices.

The herbage of low wet meadows is generally coarser and less nutritious than that of those which lie higher: hence upland hay, as it is called, is preferred for the better sort of cattle. Good grass land, to which the floods never rise, is often called meadow land when the natural herbage is permanent, and frequently made into hay.

Upland meadows are very valuable wherever there is a demand for good hay. A considerable degree of attention is required to make them most productive. Not being annually recruited by flooding, they would soon degenerate if some pains were not taken to keep up their natural fertility. This may be done in various ways: the most obvious is to recruit them frequently with the richest animal and vegetable manure, which, being spread over the surface at a time when showers are abundant, that is, either early in spring or immediately after midsummer, is washed down to the roots of the grass. A rapid growth is thus produced, which is soon perceived by comparing the appearance of a meadow which has been manured with that of one left in its natural state. It has been asserted by many agricultural authors that the produce of hay is greater when the meadows are mown every year, provided they be occasionally manured, than when mown and depastured alternately. But the productiveness of a meadow depends entirely on the circumstances of soil and situation. A meadow, the soil of which is naturally of a rich nature, and adapted to produce fine grasses, may be mown year after year without any perceptible change in the quality of the hay; while another of inferior quality requires to be occasionally cropped close, to check the growth of the coarser grasses, and to allow the finer to rise. As to the effect of taking off the hay by mowing it, compared with that of the bite of cattle, there is little difference, except that in pasturing the grass is repeatedly cropped close to the ground as soon as it rises to such a height that the teeth of the cattle can sever it. It consequently spreads by the roots, and the pile becomes closer. The urine of the cattle greatly promotes luxuriant vegetation in rainy weather, but in hot dry weather it does more harm than good. The dung, when dropped on the grass, is of little or no value compared with what it would be if mixed up with straw, earth, or peat, or diffused through water in a tank. It is therefore an excellent practice to employ women and children to collect the fresh dung in the pastures, and to carry it to a heap of earth where it may be covered up, or to a tank where it may be diluted with water.

Of late years the practice of *soiling* has been extensively adopted; that is, all the grass is mown and carried every day, in a green state, to cows or horses tied up in a stable. By this means all the advantage of mowing for hay is obtained, besides an abundant supply of rich manure, which can be applied to the land in a liquid and diluted state, when its effect is powerful and certain. So much more fodder is produced from the land by the system of soiling, that arable fields are converted into artificial and temporary meadows, in which the different species of grasses are sown, in order to be cut green or made into hay; and when, from the nature of the soil, the herbage degenerates, the field is ploughed up again, greatly improved by this change of cultivation. [GRASS LAND.]

When a natural meadow has been neglected, and the grass is of an inferior quality, and mixed with rank weeds and moss, it requires much care to restore it to its original fertility. In most cases the shortest method and the best is to plough it up, clean and manure it during a course of tillage, without taking very exhausting crops from it, and then to lay it down again in a clean and enriched state, by sowing the best sort of grass seeds; or, which is preferable, by inoculating, or planting in it small tufts of grass from some rich meadow, which will soon increase, and produce a new and improved sward. But where the soil is a very stiff clay, with only a small depth of good mould over it, there is some danger in breaking the old sward, for it will take a long time and much manure to reproduce a proper covering of grass. In this case it is a preferable practice to scarify the meadow, by means of instruments which do not go deep, but only tear up the surface. If this is done early in spring, when the ground is moist, and the whole surface is brought to resemble a fallow field, good grass seeds may be immediately sown. If rich manure, mixed with lime or chalk, is then spread over the land, and the whole well harrowed and rolled, the old and young grass will spring up together, and show a wonderful improvement in a very few months. It is prudent to mow this renovated meadow before the seeds of the grasses are formed, contrary to a common notion that in a thin meadow the seed should be allowed to shed, in order to increase the number of plants. The notion is good, but it should be done by sowing seed produced on other ground: for the ripening of the seed tends to exhaust the soil. If the grass be cut before the flower is faded, the roots will soon spread, and produce a new and improved sward.

It must be observed that it is not indifferent what cattle are turned into the meadow after hay-making. Horses invariably produce coarse weeds by their dung and urine; cows may be depastured in autumn, as long as the surface is dry; but sheep are far more advantageous, and may be kept in the meadows at all times, if they are not too wet for the health of the sheep, and if there is no danger of their having the rot. As soon as the surface becomes soft by the autumnal rains, all heavy cattle should be excluded: every tread of a horse or cow at this time destroys a portion of good grass, and makes a hollow, in which the water remains, killing the finer grasses, and producing rushes and aquatic plants.

The meadows which are to be mown should be shut up early in spring, and those which are soft and wet should have nothing larger than a sheep in them from November till after hay-making time the next year.

MEAN. By the mean of two or more quantities is meant an intermediate quantity determined by mathematical rules. There are more ways than one of finding a mean, but the two principal results of this kind are called the *arithmetical* and the *geometrical* means. The names are not properly expressive of the distinction between them, but they are established by use.

An arithmetical mean is the simple AVERAGE, formed by

adding the quantities together, and dividing by the number of quantities. A geometrical mean is the square root of the product of the quantities. Generally, let there be a number of quantities, x_1, x_2, x_3, &c., and let $\phi\,(x_1, x_2, x_3$, &c.) be a function of them which is symmetrical, that is, which is not altered when any two of them are interchanged; then if y be found from the equation

$$\phi\,(y, y, y, \&c.) = \phi\,(x_1, x_2, x_3, \&c.),$$

y may be called a species of mean.

The arithmetical mean, or average (which is always to be understood when the word mean is mentioned, unless the contrary be specified), is taken to be the most probable result of a number of discordant quantities, which would have been the same but for errors of observation or experiment. Thus if three measures of the same length give 122, 123, and 123·4, the mean of which is 122·8, it is presumed that 122·8 is more likely to be the real length which was attempted to be measured than any other. We confine ourselves in the present article to pointing out how it may be ascertained what degree of probability belongs to such results.

In assuming the average as the most probable result, it is presumed that any one measurement is as likely to err one way as the other; that is, as likely to be too small as too great. If nothing but results be known, this presumption is justifiable; but if it be known that there is more tendency to error of one sort than the other, the most probable result cannot be ascertained until it is found out by how much the average of a very large number of observations would be affected by this tendency. Say it is known that in the long run the average will be increased ·3 above the truth by a greater tendency to measure too much than too little; then 122·8 − ·3, or 122·5, is the most probable result of the preceding three observations.

It is obvious that when observations nearly agree with each other, the average must be nearly the truth required, and the nearer the agreement of the observations, the more nearly. If the observations do not agree well, the average is still more likely than anything else, but not so likely as before.

We now show how, having a number of observations, to determine the probability that the truth lies within a given degree of nearness to the average. A table must be used, which we here give to a greater extent than we should otherwise do, on account of succeeding articles. Let M be the average of a number of observations, and let M + m and M − m be the limits of which it is required to know what is the chance of the truth being between them. Take the difference between M and each of the results of observation, and add the squares of these differences. Multiply 100 times the number of observations by m, and divide by the square root of twice the sum just found: take the number nearest to the result in the column marked A, and opposite to it, in the column marked B, will be found the number of chances out of 10,000 for the degree of nearness required.

A	B	A	B	A	B	A	B	A	B	A	B
1	113	36	3893	71	6847	106	8661	140	9523	174	9861
2	226	37	3992	72	6914	107	8698	141	9539	175	9867
3	338	38	4090	73	6981	108	8733	142	9554	176	9872
4	451	39	4187	74	7047	109	8768	143	9569	177	9877
5	564	40	4284	75	7112	110	8803	144	9583	178	9882
6	676	41	4380	76	7175	111	8835	145	9597	179	9886
7	789	42	4475	77	7238	112	8868	146	9611	180	9891
8	901	43	4569	78	7300	113	8900	147	9624	181	9895
9	1013	44	4662	79	7361	114	8931	148	9637	182	9899
10	1125	45	4755	80	7421	115	8961	149	9649	183	9903
11	1236	46	4847	81	7480	116	8991	150	9661	184	9907
12	1348	47	4937	82	7538	117	9020	151	9673	185	9911
13	1459	48	5027	83	7595	118	9048	152	9684	186	9915
14	1569	49	5117	84	7651	119	9076	153	9695	187	9918
15	1680	50	5205	85	7707	120	9103	154	9706	188	9922
16	1790	51	5292	86	7761	121	9130	155	9716	189	9925
17	1900	52	5379	87	7814	122	9155	156	9726	190	9928
18	2009	53	5465	88	7867	123	9181	157	9736	191	9931
19	2118	54	5549	89	7918	124	9205	158	9745	192	9934
20	2227	55	5633	90	7969	125	9229	159	9755	193	9937
21	2335	56	5716	91	8019	126	9252	160	9763	194	9939
22	2443	57	5798	92	8068	127	9275	161	9772	195	9942
23	2550	58	5879	93	8116	128	9297	162	9780	196	9944
24	2657	59	5959	94	8163	129	9319	163	9788	197	9947
25	2763	60	6039	95	8209	130	9340	164	9796	198	9949
26	2869	61	6117	96	8254	131	9361	165	9804	199	9951
27	2974	62	6194	97	8299	132	9381	166	9811	200	9953
28	3079	63	6270	98	8342	133	9400	167	9818	210	9970
29	3183	64	6346	99	8385	134	9419	168	9825	220	9981
30	3286	65	6420	100	8427	135	9438	169	9832	230	9989
31	3389	66	6494	101	8468	136	9456	170	9839	240	9993
32	3491	67	6566	102	8508	137	9473	171	9844	250	9996
33	3593	68	6638	103	8548	138	9490	172	9850	260	9998
34	3694	69	6708	104	8586	139	9507	173	9856	270	9999
35	3794	70	6778	105	8624						

Suppose, for example, that seven observations give 10·03, 10·71, 10·98, 10·26, 10·30, 10·72, 10·81, the average of which is 10·54, differing from the respective observations by ·51, ·17, ·44, ·28, ·24, ·18, and ·27, the sum of the squares of which is ·7239, twice which is 1·4478, the square root of which is 1·203. Let it be required to find the chance of the truth lying between 10·54 + ·06 and 10·54 − ·06, we have then to multiply 700 by ·06, which gives 42, and to divide by 1·203, which gives 34·9. Opposite to 35 in the column A is found 3794, so that 3794 out of 10,000, or 3794 to 6206 is the chance of the result lying between the limits given: that is, nearly 31 to 19 against it. If the limits proposed had been 10·54 + ·1 and 10·54 − ·1, 700 multiplied by ·1 and divided by 1·203 would have given 58·2. Opposite to 58 in the table we find 5879, so that it is 5879 to 4121, or about 59 to 41, in favour of the result lying between 10·64 and 10·44.

In the preceding rule it is supposed that all the observations are equally trustworthy, or that there is no circumstance which would beforehand lead us to suppose that any one is more likely to be true than another. If this be not the case, no rule can be applied except one which depends on the observer's judgment. He must make the different observations reckon as different numbers of observations, allowing any one observation to count as more than one, if he believes it to be better than the rest. Thus suppose three observations to give 26, 28, and 29, and that it is thought there is reason to prefer 28 to the others, and 29 to 26, so that 28 ranks in the observer's mind as being as good as a mean of eight observations, 29 of six, and 26 of four. It must then be considered that there have been 8 + 6 + 4, or 18 observations, of which 8 have given 28, 6 have given 29, and 4 have given 26. These numbers, 8, 6, and 4, are called the *weights* of the several observations 28, 29, and 26, and the alteration in the preceding rule is as follows:—In forming the average, multiply each observation by its weight; add the result, and divide by the sum of the weights. Thus 8 × 28 + 6 × 29 + 4 × 26 = 502, which divided by 8 + 6 + 4, or 18, is 27·89, the most probable result. In finding the probability of the truth lying within given limits on one side or the other of this most probable average, let the average be M as before, and the limits M + m and M − m; take the difference between M and each of the results of observation, multiply the square of each difference by the weight of its observation, and add the results. Multiply 100 times the sum of the weights by m, and divide by the square root of twice the sum just found; take the number nearest to the result in the column marked A, and opposite to it in the column marked B will be found the number of chances out of 10,000 for the degree of nearness required. Thus if in the preceding instance we ask what is the chance of the truth lying between 27·89 + ·2 and 27·89 − ·2, we observe that 27·89 differs from the several results by 1·89, ·11, and 1·11, the squares of which multiplied by 4, 8, and 6, and the results added together, give 21·7778, twice which is 43·5556, the square root of which is 6·600. And 100 times the sum of the weights, or 1800, multiplied by ·2, is 360, which divided by 6·6 gives 54·6. Opposite to 55 in column A we find 5633 in column B; that is, we have 5633 to 4367, or about 56 to 44 in favour of the truth lying between the limits specified.

The inverse problem is as follows: given the observations, required the limits of difference from the average between which it is a given chance, a to b, that the truth shall lie. In both cases the first process is to turn $a:(a+b)$ into a decimal fraction of four places, and to take the numerator of such fraction.

Look for the numerator in column B, find the number nearest to it, and take out the number corresponding in column A. Multiply this by the square root used in the direct rule, and divide by 100 times the number of observations, or, if they are not equally good, by 100 times the sum of the weights. The quotient is the answer required. But when, as most frequently happens, an even chance is the given chance, use 47·7 instead of the number found in column A.

In the first of the given instances it is required to know within what limits it is 99 to 1 that the truth is contained. Here 99 :(99 + 1) is ·9900, and looking for 9900 in column B we find 9899 opposite to 182 in column A. Multiply 182 by 1·203, which gives 218·946, which divided by 700 gives ·313, so that it is 99 to 1 that the truth lies between 10·54 + ·313 and 10·54 − ·313.

In the second instance, required the limits within which it is an even chance that the truth is contained. Multiply 47·7 by 6·6, and divide by 1800, which gives ·175; and it is an even chance that the truth lies between 27·89 + ·175 and 27·89 − ·175.

The amount of departure from the average within which, on one side or the other, it is an even chance that the truth shall lie, is called the *probable error* of the observation or average of observations to which it refers. When the probable error of any one observation is given, that of the average is found by dividing it by the square root of the number of observations. Thus if there be 100 observations, of each of which it is an even chance that it is within ·1 of the truth; then the square root of 100 being 10, and ·1 ÷ 10 being ·01, it is an even chance that the average of the hundred observations is within ·01 of the truth.

For further account of the matters contained in this article, see PROBABILITIES, THEORY OF; OBSERVATION; RISK. For description of methods without demonstration, see Lardner's 'Cabinet Cyclopædia,' Essay on Probabilities. For demonstration, see the works of Laplace or Poisson on Probabilities, the article 'Probabilities' in the 'Encyclopædia Metropolitana,' or Mr. Galloway's article on the same subject (published separately), in the 'Encyclopædia Britannica.' The table may be found to greater extent in the first and two last articles cited, and also in the Berlin 'Astronomisches Jahrbuch' for 1834.

MEANDRI'NA, a genus of Lamelliferous corals. [MADREPHYLLIÆA.]

MEASLES (*Morbilli, Rubeola*) is the popular name of a contagious disease, characterised by an eruption on the skin, and affecting chiefly children.

The etymology of the word measles is uncertain, but its application to the disease we are treating of was probably borrowed from an appearance so denominated in pork, to which the eruption bears resemblance. Measles is ushered in by more or less fever, a running from the nostrils and eyes, with some inflammation of the latter, sneezing, hoarseness, a dry cough, difficulty of respiration, and occasionally slight soreness of the throat. From three to six days after the commencement of these symptoms a rash begins to appear, which first shows itself in distinct, red, and nearly circular spots, having some resemblance to flea-bites: these spots gradually coalesce and form small slightly elevated patches of an irregular figure, but approaching nearest to that of semicircles or crescents. The patches first show themselves on the forehead and face, and gradually extend downwards to the trunk and extremities. At the commencement of the eruption the catarrhal symptoms and fever are somewhat augmented, and during its height the whole face is often swollen and the eyelids thereby closed; on its decline, which begins on the fourth or fifth day, the fever ceases, and from those parts of the body previously covered by eruption the cuticle separates in small bran-like scales. A diarrhœa now commonly supervenes, and affords relief to the other symptoms. This however is the period when the danger, which is a consequence rather than a concomitant of measles, commences. The cough, which has continued throughout the active period of the disease, now assumes a more serious character; the expectoration, which hitherto has been simply mucus, indicative of the inflammation being confined to the mucous membrane of the bronchial tubes, becomes bloody, or mixed with pus, showing either that inflammation has attacked the proper substance of the lungs, or that tuberculous deposits have taken place in these organs, constituting pulmonary consumption. If the patient happily escape these dangers, others, less fatal indeed, but scarcely less to be dreaded, not unfrequently show themselves, among the most severe of which are obstinate ophthalmia and inflammation of the internal parts of the ear, the former not unfrequently terminating in partial or total loss of vision, and the latter in deafness. It must be confessed however that this is a picture, rather of what may and occasionally does happen, than of what takes place in the majority of instances; such severe terminations of the disorder are confined chiefly to the ill-fed and ill-clad children of the poor, and to the more sickly ones of the opulent. Measles frequently occurs as an epidemic, in this country usually at the beginning of spring. These epidemics vary considerably in character, being sometimes benign, at other times very fatal, and occasionally they are observed to prevail in conjunction with small-pox; like the latter disease, measles rarely attacks the same individual twice. Experiments have been made to determine how far inoculation with the blood of the parts on which the eruption appeared might succeed in moderating the violence of the disease thus artificially produced; but the cases in which it was tried were not sufficiently satisfactory to warrant its general adoption. Measles, before the outbreak of the rash, may be mistaken for severe catarrh; the eruption itself is liable to be confounded with that of Roseola, Scarlatina, Strophulus, Lichen, Urticaria, incipient small-pox, &c.; but the crescentic shape of the patches and the catarrhal character of the other symptoms can hardly fail to remove any doubt as to the nature of the disease. With respect to the treatment, little is required during the eruptive stage of the disorder, which is seldom attended with danger. It is chiefly necessary to open the bowels, to confine the patient to a light vegetable diet, with cold acidulated aqueous drinks, and to maintain a cool temperature in the room, which should be moderately darkened. Where the skin is dry and hot, sponging it with cold water has been recommended and practised with benefit. The old practice of confining the patient in heated chambers, and covered with an overwhelming quantity of bed-clothes, is now justly abandoned: the free use of the lancet during the eruptive period of the disease is likewise laid aside, and its employment restricted to those cases in which any of the vital or important organs are threatened or attacked by inflammation. Should this take place, blood-letting by lancet, cupping, or leeches, aided by blisters and such medicines as act most efficaciously in reducing inflammation, must be had recourse to. Cases in which the vital powers are low, to which the name Rubeola Putrida has been applied, of course will require an opposite mode of treatment, as the exhibition of bark, the mineral acids, and wine, together with a nutritious diet and a pure atmosphere: these too are the remedies which prove most serviceable in checking the diarrhœa, if injuriously protracted.

MEASURE. One number or magnitude is said to measure another, when the first is contained an exact number of times in the second. [INCOMMENSURABLE; PROPORTION.]

MEASURES. [STANDARDS; WEIGHTS AND MEASURES.]

MEATH, formerly distinguished as EAST MEATH, an Irish county in the province of Leinster; bounded on the north by Monaghan, on the north-east by Louth, on the east by the Irish sea, on the south-east by the county of Dublin, on the south by Kildare, on the south-west by King's County, on the west by West Meath, and on the north-west by Cavan. Its form is very irregular. Its greatest length is from the coast of the Irish Sea near Gormanstown on the east, to the bank of Lough Sheelin, or Shillin, on the west, 47 statute miles; its greatest breadth, at right angles to the length, is from the border of the county of Monaghan on the north, to the junction of the three counties, Kildare, King's County, and Meath, on the south, 39 or 40 miles. The area of the county of Meath is estimated at 488,758 statute acres, or nearly 764 square miles.* The population by the census of 1831 was 176,826, giving 231 inhabitants to a square mile. In size it may be compared with the English county of Westmoreland; in amount of population, with Northampton; and in density of population, with Durham. Trim, the assize town, is about 25 miles north-west of Dublin.

Surface; Coast-line; Geological Character.—The loftiest elevations are in the western part of the county, just to the south of the Cross-Water stream, which separates this county from Cavan. The principal hill is Sliebh-nalliogh, near the village of Loughcrew, between Old-castle and Crossakeel. There are considerable elevations also in the north-east part of the county, on the north bank of the Boyne about Slane and Newtown Fortescue. Various other parts of the county are hilly, but not so much as the districts just mentioned. (*Maps subjoined to Irish Railway Commissioners' Second Report; Population Returns.*)

The coast has a tolerably straight outline running south by east from the mouth of the Boyne to the boundary of the county of Dublin near Gormanstown. The shore is low, skirted by sand-banks or hills, and broken by one or two small streams which flow into the sea.

The county of Meath is for the most part included in the

* We take this from the 'Parliamentary Returns.' The table given with Mr. Larkin's Map published by the grand jury of the county, A.D. 1817, makes the area 566,657 statute acres; and that subjoined to the 'Map of Ireland published by the Society for the Diffusion of Useful Knowledge, 575,413 acres.

great central carboniferous limestone district of Ireland; the whole of the southern part of the county, and considerable portions of the north and west, are occupied by this formation. The limestone districts are comparatively low and flat, as they usually are in Ireland, while in England they have, from their ruggedness and elevation, given to their component rocks the distinctive designation of mountain limestone. A part of the Meath limestone-beds belongs to the calp or black shale series, composed of alternations of impure black argillaceous limestone with black shale containing balls of grey ironstone. From beneath the beds of the calp series, those of the lower limestone crop out. It is probable that from beneath these the lowest series of the carboniferous limestone beds are found cropping out near the limits of the limestone district; this lowest series consists chiefly of a yellow sandstone, sometimes interstratified with dark-grey shale and dark-grey limestone; in some localities it contains very thin beds of impure coal.

The hilly parts of the county belong to the transition district, which extends from the coast of the county of Down into the counties of Longford and Roscommon. The rocks of this district are greywacke-slate, fissile clay-slate, flint-slate, and chlorite-slate. A small tract, insulated in the midst of this transition district, is occupied by the rocks of the limestone formation already described, and by a small coal-field, the beds of which rest upon the limestone. This coal-field is partly in the county of Monaghan, partly in that of Cavan, but chiefly in Meath. Many trials have been made, but no coal worth working has been found. (*Irish Railway Commissioners' Second Report*, Appendix; and *Geological Map.*) Limestone and marl are abundant.

Rivers.—The county belongs almost entirely to the basin of the Boyne; a small portion in the northern part of the county belongs to that of the Dee; the heights about Slane separating the two. The southern and south-eastern borders are watered by the affluents of the Liffey, or by some smaller streams which flow into the sea between the Liffey and the Boyne.

The Boyne touches the border of the county at its south-western extremity, and after dividing it for a few miles from the county of Kildare, passes within the boundary and flows in a winding channel north-east by Trim to Navan, where it receives the Blackwater, its chief tributary. The Menagh (which skirts the south-western border of the county till its junction with the Boyne at the spot where the latter first touches the border), the Blind, the Blackwater (which divides Meath on the south side from the county of Kildare), and the Deel, all small streams, join the Boyne before it receives the greater Blackwater. From the junction of the last, the Boyne flows east-north-east by Slane to the border of the county, and from thence along the border (separating Meath and Louth) into the sea at Mornington, below Drogheda. The length of that part of the Boyne which is in the county of Meath or upon the border is about 56 miles. It is navigable in the natural bed of the stream to above Drogheda (where it is crossed by a bridge), and afterwards partly in the natural bed and occasionally by a lateral cut or canal, to the junction of the Blackwater at Navan, about 23 miles from its mouth. The Blackwater touches the border of the county on the north-west side at the junction of the Crosswater, a small brook which, as well as the Blackwater itself, separates Meath from Cavan. The Blackwater soon quits the border and flows east-south-east, 18 miles, into the Boyne at Navan. It passes near the town of Kells. It receives a considerable stream, to which the maps give no name, from the border of the county near Moyonalty. The continuation of the Boyne navigation to Trim, and the making of the Blackwater navigable to Kells, would be of the greatest advantage to the county.

The Nobbor rises from some bogs and small lakes on the northern side of the county near Kilmainham; it flows in a winding course, first south-east, then north-east until it quits the county to enter that of Louth, where it unites with the Dee. Its length in this county is about 18 miles.

Lakes.—There are several small lakes. Lough Sheelin, which separates the counties of Meath and West Meath from that of Cavan, is of an oval form, 5 miles long from north-east to south-west, and about 2½ miles broad. It contains a small islet, called Church Island, with the ruins of an old church in it. Lough Bawn, 1½ mile long, but very narrow, and some smaller lakes, are on the western border of the county. The lake of Kilmainham, formed by an expansion of the river Nobbor, is about one mile long and above a quarter of a mile broad. Bogs are numerous, but the aggregate of their extent is small: the largest bog is on the border of the county south-west of Athboy; it is partly in Meath and partly in West Meath. (*Railway Commissioners' Reports; Larkin's Map.*)

Canals, Railroads, and other Communications.—The Royal Canal enters the county near Kilcock (Kildare county), and runs for some miles just within the border, occasionally quitting it for the adjacent county of Kildare. It is carried by an aqueduct over the smaller Blackwater and by another aqueduct over the Boyne, soon after crossing which it enters West Meath. About 14 or 15 miles of this canal are within the county. It opens a communication with Dublin at one end, and the Shannon, near the town of Longford, at the other.

A railroad from Dublin to Drogheda, for which an act has been obtained, is to cross the county from south to north along the coast. The lines laid down by the government commissioners for the railroads from Dublin to Enniskillen and Armagh respectively also cross this county. They coincide in the first part of their course, entering the county on the south side near Dunboyne, about 8 miles from Dublin, and running from thence north-west about 20 miles to Navan. Here the lines separate; that to Armagh running north about 17 miles, till it enters the county of Louth; and that to Enniskillen continuing to pursue a north-western direction about 16 miles, till it enters the county of Cavan. Surveys have been laid before the commissioners for the following railway lines across this county. One from Dublin to Sligo and Galway crossing the county from Kilcock (county Kildare), nearly parallel to the Royal Canal, into the county of West Meath. A branch from this by Trim passes to the Enniskillen line at Kells; and a branch from the Enniskillen line near Kells runs westward into the county of West Meath, joining the Sligo line at Longford. A line collateral to the Armagh line and to the east of it passes near Ratoath and Slane, and another line runs from Navan to Drogheda.

The principal coach-road is that from Dublin to Drogheda, Dundalk, Newry, and Belfast, with a branch to Armagh. From Dublin to Drogheda this road has two branches, one near the coast through Gormanstown, the other more inland. There are well frequented roads from Dublin to Virginia, Cavan, and Enniskillen, through Dunshaughlin, Navan, and Kells; from Dublin to Granard by Trim and Athboy, with a branch by Old Castle to Killyshandra; and from Dublin to Longford, Carrick on Shannon, and Sligo by Clonard, in the south-west part of the county. A considerable number of passengers travel by the Royal Canal from Dublin and Kilcock to Mullingar in West Meath. The principal roads for the conveyance of goods are from Dublin by Navan and Kells to Virginia; and from Drogheda (one of the principal ports of Ireland) by Slane to Kells, and by road to Navan. The land traffic on this latter line would probably be greater but for the communication between the towns of Drogheda and Kells by means of the navigation of the Boyne. There is considerable traffic also from Dublin to Trim and Athboy, and from thence to Oldcastle; also from Kells to Oldcastle on one hand, and to Bailyborough (county Cavan) on the other. (*Railway Commissioners' Second Report.*)

The county appears to be on the whole tolerably well provided with roads.

Soil; Agriculture; Condition of the People.—This county has very few mountain-wastes, and the proportion of bog is small. The land is for the most part flat rich pasture-land. There are a few fine domains, especially those of the marquis of Conyngham and of the Lambert family, near Slane, and that of the marquis of Headfort, near Kells; and there are many gentlemen's houses scattered through other parts of the county. The soil is for the most part a loam of the richest character, and in many places of such depth that the turning up of a fresh portion of the soil by ploughing deeper than usual is considered as an efficient substitute for manuring. In some baronies animal manure alone, or mixed with bog-stuff or peat, is chiefly used; in others 'marl-sand,' a valuable mixture of calcareous matter and alluvial deposit, is used; and also lime. The farms vary in size from 2 acres to 3000 acres, but are on the average larger than in most other parts of Ireland; the grazing farm average about 150 acres; and tillage farms 20 to 50. The mode of farming, though very slovenly and defective, bears some resemblance to that of England. Summer fallows,

though coming into disuse, have been considered necessary, owing to the rank luxuriance of the weeds. The rotation of crops in small farms is, usually, fallow or potatoes with manure; second year, wheat; third year, oats; and, frequently, fourth year, oats. Larger farmers sow clover the fourth year, which remains one year or more, and is followed by oats; a few sometimes grow barley instead of wheat the second year. The practice of growing potatoes as a preparation for wheat, instead of leaving the land fallow, is increasing. Flax is seldom grown in large quantities for sale, but small patches for domestic use are general: a strong kind of dowlas and some sheetings are made from it in the country. Turnips, mangel-wurzel, vetches, rape, grey and white peas, beans, and cabbages, are cultivated, but not generally; turnips are grown only by the wealthier farmers, who unite grazing with tillage, and are chiefly used for feeding sheep; cabbages succeed well, but the expense of transplanting, and the liability to depredation, are great objections to this crop. The whole quantity of land devoted to green crops is small, in consequence of the abundance of the natural pastures, which are of unequalled richness, and have led the farmers to give their chief attention to grazing. The growth of clover and vetches is however gaining ground.

The quantity of cattle fattened in the pastures of the county is considerable; but as the rent of land is too high to admit of its being used to breed stock, the cattle which the graziers intend to fatten are collected from various parts. The English long-horned breeds were introduced many years ago, and some of the best specimens in Ireland are to be found in Meath. The breeds most in request are the Durham 'short-horned' and the Hertford breed for fattening, and the Ayrshire for milch cows. After being bled, the cattle are turned out until they are fit for the butcher. The pastures are opened in May for grazing the stock designed to be fattened in the ensuing summer. The best-conditioned of the heifers, which are half fat, are put to the forwardest grass, and supply the Dublin market in June, July, and August, when beef bears the highest price. The season for slaughtering cattle to supply shipping with salt provisions commences in September, and after its commencement the graziers rely chiefly on the northern buyers, who purchase the cattle at the fairs in or near the county, and sell the beef for home consumption, or salt and barrel it for exportation.

Meath, in regard to the quality of its grazing land, is the first county in Leinster, and grazing is carried on on a large scale. Many persons fatten from 300 to 500 cows in a season, besides bullocks and sheep. Oxen are frequently employed in the plough.

On many farms the landlord supplies land, horses, and a succession of cows in milk; the tenant furnishes labour and utensils, and pays for making the hay used by the cows. The skim-milk is mixed with the butter-milk, and sold to the retailers of Dublin, who vend it to the poor. From December to May the dairy-cows are fed on hay, straw, or a mixture of both, and are housed at night.

There are large flocks of sheep kept by the more extensive farmers; the small farmers rarely keep any. A good deal of mutton is fattened, but few of the sheep are bred in the county. They are chiefly purchased at the fair of Ballinasloe (county Roscommon) in October; some of these are fed during the winter on rape and turnips, and are sold at Dublin in the spring; the rest are turned out into the pastures previously used for the summer stock of cattle, and are fed in addition with hay. In May and June, after shearing, or perhaps in July or August, they are fat enough for the Dublin market.

From the low price of corn and the rise of the value of wool and stock consequent on the more rapid and certain communication with England, grazing has been for some years increasing.

The horses are generally inferior. 'Every farmer who holds a hundred acres and upwards keeps one or two mares, which he breeds from, and works to within about a fortnight of the time of their dropping their foals: these he rears, and in the spring before they are three years old he either sells them in the halter or works them in his own team; from which time to the day of their death they lead a life of hardship, and often of starvation. Bad feeding and hard working in their youth prevent their growing to their full size.' A large, long, blood horse, which sells for a high price, is much reared in this county.

Pigs are of a good breed, and are nearly or quite as common as in most other parts of Ireland. Poultry is abundant and cheap. Bees are kept in several districts.

Draining appears to be better understood in Meath than in many other parts, though there is much need of its being further extended. Under-drains are constructed on a peculiar but efficient plan.

Wood is not abundant, ground being too valuable to be occupied by plantations, except about noblemen's and gentlemen's demesnes for the purpose of ornament. Plantations for this purpose are however numerous, and timber-trees are common in the hedge-rows. Oaks are scarce; the beech, elm, ash, sycamore, poplar, and alder are more plentiful. There are several nursery-grounds, especially a very extensive one near Navan. From the small extent of the bogs and the deficiency of wood, fuel is scarce, and the poor often suffer severely from the want of it. (Wakefield's *Account of Ireland.*)

The population is most dense in the northern and western parts of the county, where there are 200, and in one part (the barony of Morgallion) 240 inhabitants to a square mile. In the south-western parts, and around Slane, and on the coast, the proportion is about 170 inhabitants to a square mile. In the central and southern parts the population is thinner, varying from 110 to 140 persons to a square mile. The disproportion between the demand and supply of labour varies. In some parts there are no destitute poor, the residence of the proprietor furnishing employment, and the limitation or decrease of the number of cabins repressing the increase of population; but this absence of destitution in some spots is counterbalanced by the throngs of unemployed and destitute poor on the edges of commons and bogs, in poor villages, and in the suburbs of towns. In the baronies of Upper and Lower Kells, which are among the most densely peopled, from one-fourth to one-tenth (the proportion varying in different parishes) of the labourers are in constant work, about one-tenth are almost constantly out of employment, and the remainder are employed from two to eight or nine months in the year. Men's wages are about 10*d.* per day, except in winter, when they fall to 8*d.*, and in harvest, when they rise to 1*s.* 3*d.* or 1*s.* 6*d.*; boys under sixteen years earn usually about 4*d.*, in winter 3*d.*, and at harvest 6*d.* to 8*d.*; women earn 4*d.* to 6*d.*, and in harvest 6*d.* to 10*d.*, but have no work at all in winter. Wages are not usually paid in kind, except to herds and shepherds, who have meal, potatoes, or grass for a cow or several sheep, to the amount of about half their wages. In harvest-time it is usual to pay the labourers partially in food. From low wages and insufficient food, combined perhaps with other causes, the peasantry are neither so skilful nor persevering in labour as the English. The cottiers generally keep a pig, though in many cases a pecuniary loss is incurred: the reason for this apparently unprofitable practice was shrewdly stated to the commissioners for inquiring into the condition of the Irish poor, by a peasant, who observed that 'his pig was his savings' bank; for that he was obligated to save every penny that he could to feed him, and he did not so much miss it a little at a time; and that it came in again all in a lump, when he sold him to pay his rent.' The wives of the labourers generally rear fowls, and they make a trifle by the sale of the eggs and chickens.

The only home manufactures are a little coarse linen, sometimes, though rarely, a little coarse frieze coating, and the knitting of coarse worsted stockings, which last branch of industry is still pretty commonly done by girls, widows, and old women, who earn at this work about 1*s.* 3*d.* a week. Spinning and weaving, from the cheapness of manufactured goods, have almost entirely ceased.

Potatoes form the chief food of the labourer: oatmeal is used in summer by those in good employment, and on some particular occasions they have an egg, a herring, or a morsel of bacon as a treat. Small farmers eat herrings, eggs, and butter; but no meat, except sometimes a little of their own bacon. The cabins of the peasantry are wretched. Of furniture they have scarcely anything: the master of the house (with his wife, if married) sleeps on a frame of rough wood, split poles, stout sticks, &c., raised off the floor by stone blocks or other supporters, and called a bedstead; the rest of the family sleep on the floor; the only bedding is straw rushes, or, in a very few cases of unusual luxury, a piece of coarse sacking tick filled with chaff. An old threadbare blanket, often full of holes, pieces of old carpet

with the day clothes of the family, form the night covering. The most miserable habitations are in the suburbs of towns and around bogs. Cases of bastardy are very rare, and incur general opprobrium; but this opprobrium falls too heavily and exclusively on the weaker party. Drunkenness is rare among the labourers and their wives; more frequent among the small farmers and tradesmen. (*Report of the Commissioners for inquiring into the Condition of the Irish Poor.*)

There is no return of the quantity of corn sold in the principal markets for the ten years last before 1836.

Divisions, Towns, &c.—Meath is divided into eighteen baronies, which, with their relative position, and population in 1831, are as follows:—

1.	Deece, Lower	Central	3,931
2.	Deece, Upper	S.	5,294
3.	Demifore or Half Foure	W.	13,717
4.	Duleek, Lower	E.	10,020
5.	Duleek, Upper	E.	8,941
6.	Dunboyne	S.E.	2,698
7.	Kells, Lower	N.W.	13,666
8.	Kells, Upper	N.W.	20,462
9.	Lune	W.	12,212
10.	Morgallion	N. and Central	11,990
11.	Moyfenragh, Lower	S.	11,893
12.	Moyfenragh, Upper	S.W.	8,631
13.	Navan, Lower	Central	16,234
14.	Navan, Upper	Central	4,857
15.	Ratoath	S.E.	6,685
16.	Skreen or Skryne	Central	8,683
17.	Slane, Lower	N.	9,647
18.	Slane, Upper	N.E.	7,265
		Total	176,826

Population.

Date.	How ascertained.	Houses.	Families.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort	22,468	..	..	..	..	..	..	112,400
1813	Under Act of 1812	25,921	..	..	..	..	..	..	142,479
1821	Under Act 55 Geo. III., c. 120	27,942	30,125	..	..	..	79,778	79,405	159,183
1831	Under Act 1 Will. IV., c. 19	29,796	31,632	22,396	4,575	4,661	88,993	87,883	176,826

The towns are—the assize, market, and post town of Trim, the market and post towns of Athboy, Duleek, Kells, Navan, Oldcastle, and Slane; the post towns of Ashbourne, Clonard, Clonee, Crossakeel, Dunshaughlin, Enfield, and Nobber; and the ex-parliamentary borough of Ratoath.

Trim, Athboy, Kells, and Navan, and the village of Duleek, were all formerly parliamentary boroughs.

Trim is partly in the barony of Upper Navan, but chiefly in that of Lower Moyfenragh, 32 English miles from Dublin. It is a very antient town: on the conquest of this part of Ireland by the English, it was conferred, with the rest of the county, on Hugh de Lacy, who made it a free borough. His son Walter gave it a charter of incorporation: and as the head of the lordship of the De Lacys, it acquired importance, and several of the early Irish parliaments were held here. In the civil war of 1642, the Catholics who held it were expelled, and the Parliamentarians garrisoned it under Sir Charles Coote; but he being killed, the place appears to have been lost, for in 1649 it was held by a royalist garrison, which quitted it on the approach of Cromwell, intimidated by the massacre of the garrison of Drogheda.

The town is pleasantly situated on the river Boyne: many of the houses are neatly built, and the environs are pleasant. There is an old bridge over the river, and an antient castle of venerable appearance; the keep, a massy pile strengthened by four round towers at the corners, is yet standing, as well as several of the outworks. The church is modern, except the tower, which is of great antiquity. There are some remains of an antient abbey; and a handsome Corinthian column erected in honour of the Duke of Wellington.

The population of the town in 1831 was 3282; 400 of them Protestants, the rest Catholics: that of the outparts of the parish, which is extensive, was 2644: together, 5926. The place has been declining for years, and presents on the whole a very impoverished appearance. It has no extensive trade or manufacture; the principal traffic is with Dublin and Navan. The market, which is on Saturday, has increased: there are five yearly fairs. The assizes are held here, and the quarter-sessions for the division twice in the year. The county court-house and gaol are here. The town returned members to the Irish parliament, but was disfranchised at the Union. The corporation consists of a portreeve, burgesses, and freemen, who are all now members of the Established Church. The living is a vicarage, united to several other benefices, and the town is at the head of a Roman Catholic district or union. Trim is the head-quarters of the constabulary police, and the residence of the inspecting magistrate.

Athboy is in the barony of Lune, 7 miles north-west of Trim, and 36 from Dublin. It is an antient borough: the municipality received a charter from Henry IV.; and Elizabeth conferred on the place the elective franchise, which it lost at the Union. The corporation then fell into disuse, and is now extinct. The town has a population of 1959; the outparts of the parish (which is extensive) of 3358: together, 5317.

There are four fairs in the year. The town is the chief station of the constabulary force for the district: petty sessions are held weekly. There are extensive flour-mills, but the town is poor, and does not seem to be improving. The living is a vicarage attached to the union of Athboy; the parish is also the head of a Roman Catholic union. There are a dispensary, almshouses for twelve poor widows, and several schools.

Duleek is partly in the barony of Upper Duleek, but chiefly in that of Lower Duleek, on the Nany or Nannywater. There were antiently three religious houses, of two of which the ruins yet remain; and the town was the seat of a bishopric, ultimately merged in that of Meath. There were, in 1831, 233 houses and 1217 inhabitants in the town; and 733 houses and 1190 inhabitants in the whole parish. There was formerly an extensive manufacture of ticking, but it is now much diminished. There is a market on Thursday, and there are four yearly fairs. Races are held in the neighbourhood. Petty sessions are held here, and the town is one of the stations of the county constabulary force. Duleek returned members to the Irish parliament, but was disfranchised at the Union, and the corporation became extinct. The parish is part of a union, both in the Established and Catholic churches. The parish church is a modern building: the Catholic chapel is a handsome Gothic edifice, and has a school-room adjoining. There are in the parish several public schools and a dispensary. There are in the town two stone crosses, and in the parish another elaborately carved.

Kells is in the barony of Upper Kells, nearly 40 miles from Dublin through Navan. It is a town of great antiquity, and, previous to the arrival of the English, had a monastery of regular canons. It was fortified by the English with a castle and walls. The monastery, which had been plundered, was endowed with new grants by Hugh de Lacy; and Walter de Lacy, son of Hugh, founded another monastery for Crouched friars. The town became flourishing, but the dissolution of the monastic establishments and the repeated wars which desolated the country caused its decay.

Kells is pleasantly situated on the south bank of the Blackwater. The principal street is very broad; the streets generally are well kept, and the town presents an appearance of neatness. The population of the town, in 1821, was 3618; in 1831 it had increased to 4326: the population of the whole parish was 6839. The market, which is held on Saturday, has so increased as to have rendered an enlargement of the market-place necessary. The quarter-sessions

for the division are held twice in the year at Kells, twice at Navan. There are a bridewell and a fever hospital. It is the station of a chief constable and fifteen others of the county constabulary police.

There is a corporation, consisting of a sovereign, two provosts, and twenty-four burgesses; with a recorder and other officers. The sovereign, the provosts, and a few of the burgesses constitute the common-council or managing body: they have no jurisdiction. Kells returned members to the Irish parliament from the time of Elizabeth to the Union. The parish is at the head of a parochial union, both in the Established Church and among the Catholics. The parish church is an antient building: near it is an antient round tower, unroofed, about 90 feet high. There are two fine old crosses, one in the church-yard and one in the street near the market-place; also an antient stone roofed cell or chapel.

Navan is in the barony of Lower Navan, 29 miles from Dublin, and at the junction of the Blackwater with the Boyne. The principal streets are kept in repair by the county. There are two bridges, one over the Blackwater and the other over the Boyne. There are a court-house, containing rooms for holding the sessions and a suite of assembly-rooms; a bridewell, a county infirmary, and a fever hospital. The parish church is a neat modern building: the Roman Catholic chapel is an extensive building of Grecian architecture. The population of Navan, in 1831, was 4416; that of the whole parish 5292. The town is in the centre of a great corn district, and has an excellent corn-market on Wednesday; there is a market also on Saturday; there are four yearly fairs. There are several corn-mills, a linen yarn-mill, and a woollen manufactory near the town. Some sacking and packing canvas are made. The corporation consists of a portreeve and twelve burgesses, with a town-clerk and other officers. The portreeve acts as a justice of the peace for the borough conjointly with the county magistrates. Navan returned members to the Irish parliament from the time of Elizabeth till the Union. Petty sessions are held here every fortnight, and the quarter-sessions for the division twice in the year. The parish is at the head of a union, both in the Established and Catholic churches. There are several schools; one of them a Catholic seminary for youths designed for the priesthood or either of the learned professions.

Oldcastle is in the barony of Demifore or Half Fowre, 58 miles from Dublin. The town comprehends 237 houses, and a population of 1531; the whole parish has 778 houses, and a population of 4718. There are a church, a plain modern building: a large but plain Catholic chapel; and a Primitive Methodist chapel. There is a large school-house for a Lancasterian school, capable of containing 1000 children. This school has an endowment of 800*l.* a year. Petty sessions are held here every fortnight; and the market, which is on Monday, is one of the largest yarn-markets in the county. There are extensive corn-mills near the town. There are three considerable yearly fairs. There are considerable limestone quarries and large flour-mills in the parish. The living is a rectory not united; the parish is included in a Catholic union.

Slane is in the barony of Upper Slane, 28 miles from Dublin. In the early ages of Christianity it was the seat of a bishopric. The town is pleasantly situated on the north bank of the Boyne, over which there is a bridge. The surrounding country is rich; and the houses are chiefly modern and of neat appearance. Slane Castle, the seat of the marquis Conyngham, is on the bank of the river just above the town. The population of the town, in 1831, was 896; of the whole parish, 2516. The parish is the head of a Catholic union: the living in the Established Church is a rectory, in the gift of the crown. There are several schools. There is a group of tumuli in the neighbourhood; the largest is a mound 70 feet high, and having at the top an irregular area, 300 feet in circumference. This mound, when opened, was found to conceal the entrance to a gallery leading to a remarkable excavation or cavern. Slane is one of the stations of the county constabulary force.

Ashbourne is a small place in the barony of Ratoath, 13 or 14 miles from Dublin on the road to Londonderry. It is a small place containing 60 houses and a population of 473. It has a Catholic chapel, a neat modern building.

Clonard, in the barony of Upper Moyfenragh, 33 miles from Dublin, was a place of note in antient times. It had an abbey which became the seat of a bishop, whose diocese was augmented, previous to A.D. 1152, by the addition of the bishoprics of Trim, Ardbraccan, Dunshaughlin, and Slane. This diocese was afterwards designated the diocese of Meath, but the cathedral continued to be at Clonard till A.D. 1206. The abbey had previously been repeatedly plundered by the Danes or the natives; and about A.D. 1175 Hugh de Lacy erected an Augustinian monastery, probably on its ruins. Clonard was the scene of conflict in the war of 1641 and the insurrection of 1798. It is a station of the county constabulary police, though a mere village or hamlet of 10 houses and 66 inhabitants. There is a large Catholic chapel in the village, the parish church is half a mile distant.

Clonee is in the parish and barony of Dunboyne, just within the boundary of the county, about 9 miles from Dublin, on the road to Navan. Clonee is a station for the county constabulary force. The population in 1831 was 217.

Crossakeel is about 46 miles from Dublin. It is in the parish of Kilskyre, or Kilskeer, and in the barony of Upper Kells. Petty-sessions are held here once a fortnight and it is a station of the county constabulary force: there are three yearly fairs. The parish church is in the village, and there is a dispensary. The population of the village in 1831 was 290; of the whole parish, 4537.

Dunshaughlin, in the barony of Ratoath, 17 miles from Dublin, was formerly a corporate town. It is now a post town or village of 157 houses and 913 inhabitants for the town, or 261 houses and 1940 inhabitants for the whole parish. It has a parish church of modern erection, and a Catholic chapel. The petty sessions are held every fortnight, and the quarter-sessions for the division, twice in the year: it is a station for the county constabulary force. There is a dispensary in the town, and there are two public schools.

Enfield is in the parish of Rathcore and in the barony of Lower Moyfenragh, 26 miles from Dublin, near the Royal Canal. It is a station of the county constabulary. It had in 1831, 45 houses and 302 inhabitants.

Nobber is in the barony of Morgallion, 40 miles from Dublin. It was antiently a fortified town, and was regarded as of importance. It now contains 58 houses and 371 inhabitants; the whole parish has 671 houses and 3952 inhabitants. The church is a plain neat building; the Catholic chapel is also a neat building of modern erection; and there is a school-house. Near Nobber is a large Danish camp, and in the churchyard are the remains of a structure, supposed to have belonged to the Knights of St. John of Jerusalem. There is a well attended cattle and pig fair. Nobber is a constabulary police station. Carolan, the celebrated Irish harper, was born here.

Ratoath is in the barony of Ratoath, 15 miles from Dublin. It was a parliamentary borough previous to the Union, by which it was disfranchised. There were in 1831, 96 houses and 552 inhabitants in the town, or 283 houses and 1779 inhabitants in the whole parish. There are three yearly fairs, but no market; a trifling manufacture of sacking and of linen is carried on. It is one of the stations of the county constabulary force.

Ecclesiastical and Legal Divisions.—The county is for the most part included in the diocese of Meath; but small portions are comprehended in those of Armagh and Kilmore; all these dioceses are in the ecclesiastical province of Armagh. The county is included in the home circuit. The assizes are held at Trim. The Easter and Michaelmas sessions for the two divisions of the county are held at Kells and Dunshaughlin; the Hilary and Midsummer sessions, at Trim and Navan. Before the Union Meath sent 14 members to the Irish parliament, two for the county, and two each for Trim, Kells, Navan, Athboy, Duleek, and Ratoath; at present it sends only the two county members, who are elected at Trim.

The police force of the county on 1st January, 1836, was, 1 magistrate, 7 chief constables, including subinspectors (of whom 5 were of the first and 2 of the second class), 58 constables, and 266 subconstables, with 9 horses. The cost of maintaining the constabulary for 1835 was 11,893*l.* 13*s.* 4*d.*, of which amount 6197*l.* 3*s.* 4*d.* was chargeable against the county.

The county-gaol at Trim has been much improved, as respects the male side of the prison, but much is yet requisite to be done to bring the discipline of the prison to what it should be. It is clean; the prisoners generally are classified, and considerable advance has been made in the system

of instruction in trades. There are two schools in the prison, and a treadmill. The bridewells at Navan and Kells are both tolerably extensive prisons, containing sixteen cells, two day-rooms, and two yards; they have every means of classification required by the Prison Act. (*Appendix to Fourteenth and Fifteenth Reports of Inspectors-General*, 1836.) The number of persons committed for criminal offences in 1836 was—for offences against the person 85 (44 convicted, 41 acquitted or discharged); for offences against property committed with violence 28 (convicted 9, acquitted or discharged 19); for offences against property without violence 107 (convicted 54, acquitted or discharged 53); for malicious offences against property, such as arson, killing or maiming cattle, and the like, 4 (1 convicted, 3 acquitted or discharged); for forgery and offences against the currency 4 (2 convicted, and 2 acquitted or discharged); for other offences 105 (45 convicted, 60 acquitted or discharged): making a total of 333 persons committed, of whom 155 were convicted and 178 acquitted or discharged. There was no person executed. Of the persons committed, 277 were males (1 of them under 16 years) and 56 females (1 under 16): 71 could read and write, 54 could read only, and 110 were entirely ignorant; of 98 the degree of instruction they had received could not be ascertained.

The lunatic asylum for the counties of Meath, Louth, Dublin, and Wicklow, is the Richmond Lunatic Asylum at Dublin. Of 284 patients in that institution on 1st January, 1837, 30 belonged to this county. The county infirmary is at Navan, and there were, in 1833, fever hospitals at Kells and Navan, and nineteen dispensaries at different places in the county, supported in nearly equal proportions by private subscriptions and grand-jury presentments.

History; Antiquities.—Meath appears to have been included by Ptolemy in the territory of the Βλανιοι (Blanii), or 'Εβλανοι (Eblani), a nation whose sway extended over the neighbouring counties of Dublin and Wicklow, and whose name may be traced in the first syllable of the province of Lein-ster. At an early period Meath constituted one of the kingdoms into which Ireland was divided, and comprehended, it is likely, not only the present counties of East Meath and West Meath, but also the whole or part of those of Longford, Cavan, and King's County. Teamor, now Tarah Hill, near the Boyne, between Dunshaughlin and Navan, was the residence of the sovereign of Ireland and the seat of the supreme government, and the place where St. Patrick made his first efforts for the conversion of the Irish to Christianity. It is probable that the kingdom of Meath was erected in the second century of the Christian æra as the immediate domain of the Irish monarchs; or if not then first erected into a kingdom, was placed under the immediate government of the Irish monarchs, while the rest of the island owed them only feudal obedience. At a subsequent period the government of Meath was separated from the monarchy, which was so far weakened by the separation as to become little more than a nominal supremacy; the kings of Meath ranked as subordinate princes, but they constituted one of the two lines of the great family of the Hy-Nialls, by which the supreme government was alternately possessed. Teamor ceased to be the seat of the national government.

In the invasions of the Northmen, or Danes, the kingdom of Meath suffered severely. Turges, a Danish leader, in the early part of the ninth century, established himself at Lough Rive (Ree?), and after cruelly ravaging the kingdoms of Connaught and Meath, was seized and put to death, probably at Lough Uar, near Mullingar in the present county of West Meath, by Melaghlin, or Malachi, king of Meath, who afterwards acquired the supreme power. The Northmen however soon renewed their attacks, and civil dissensions diverted the Irish from resisting the common foe. For several centuries Meath was exposed to their ravages, or those of other Irish princes with whom the kings of Meath were at war.

Traces of this period of confusion exist in the numerous camps and earthworks that overspread the district; and the frequent destruction of monasteries and towns recorded in the annals of the religious houses is another attestation of the prevalent ruin. The last king of Ireland of the Hy-Niall family was Melaghlin II., who, though reduced to abdicate the supreme authority for a time in favour of Brian Boromy, king of Munster, resumed it upon the death of that prince (who fell in battle against the Northmen at Clontarf near Dublin, A.D. 1014), and reigned till his own death, A.D. 1022, about 150 years before the invasion of Ireland by Henry II.

Before the invasion of the English, Dermond, or Dermod MacMurchad, king of Leinster, had reduced O'Melaghlin, or Melaghlin, king of Meath, and other princes, into a state of subjection; but having roused indignation by the abduction of the daughter of Melaghlin, who had married O'Ruarc, or O'Rourke, king of Breifne, or Brehny (now the county of Leitrim), he was expelled by Melaghlin and others, aided by his own subjects, and compelled to flee to England, where he engaged the Anglo-Normans in the conquest of his native island. Richard, earl of Strigul or Chepstow, commonly called Strongbow, the leader of these auxiliaries, took possession of Meath (A.D. 1171), which was conferred by Henry II. as a county palatine (or feudal lordship, the holder of which had several regal rights), on Hugh de Lacy, who was appointed governor of the English pale or district. Hugh de Lacy built a strong fortress at Trim, which was burned, A.D. 1173, in an attempt which the Irish made, under their king Roderick, to reconquer the country. The Irish were however repelled, and the ruined castle of Trim was restored. De Lacy parcelled out his territories among his followers, whom he created barons, whence is derived the subdivision of counties into baronies.

Meath however appears to have passed again into the power of the natives; for in 1178 De Lacy, who had been reappointed governor of Ireland, and held that office for a short time, restored the English power there. (Gordon's *Hist. of Ireland.*) In the general rebellion excited by the petulance of Prince (afterwards King) John, whom his father Henry II. sent over as governor, Meath was preserved to the English by the valour of William Petit, who defeated the Irish invaders (A.D. 1186). About the same time Hugh de Lacy was assassinated by one of the workmen employed on a castle he was then erecting at Durrogh, in what is now King's County. His son, Hugh de Lacy the Second, who appears to have succeeded him in his county of Meath, was afterwards appointed governor of Ireland, in which office however he was soon superseded, agreeable to the policy, at least the practice, of that day, which seldom allowed a governor to retain office any length of time. De Lacy, in his character of earl of Meath, was engaged as auxiliary (A.D. 1200) in a contest between two Irish princes for the sovereignty of Connaught; and having been reappointed by King John lord-justice or governor of Ireland, he was defeated by John De Courcy, the Anglo-Norman earl of Ulster, whom he was commissioned to arrest and send over to England. He succeeded however in getting De Courcy into his hands by treachery and sending him over to England. He afterwards received the earldom of Ulster as his reward.

The ambition and power of Hugh de Lacy, now earl of Ulster, and of his brother Walter, who appears to have succeeded him in the earldom of Meath, having excited the jealousy of John, that king visited Ireland in person (A.D. 1210), and spent some months in reducing the fortresses in Meath and Ulster belonging to those nobles, who had fled to France, and did not obtain restoration to their estates and honours without the payment of a heavy fine. Meath seems at this time to have lost its privilege as a palatine county, and to have been made subject to the jurisdiction of the king's officers. The De Lacys acted a conspicuous part in the feuds of the Anglo-Norman lords of the Pale, and Meath suffered from these intestine commotions. Upon the decease of Earl Walter, Meath came to his two daughters, who divided his inheritance between them. West Meath, which fell to the elder, who was married to Sir Theobald Verdon, appears to have been so neglected, and fell into such a state of anarchy, that it did not obey the English laws for above a hundred years. (Baron Finglas's *Breviat.*, temp. Henry VIII.) East Meath, the portion of the younger daughter, married to Sir Geoffry Genneville, was also wrested from its owners, either by native chieftains or Anglo-Norman rivals.

The English dominion, never fully established, appears rather to have decayed during the reigns of the later Plantagenet and the Lancastrian princes, and the civil war of the Roses. The native Irish renewed their incursions; and in A.D. 1329, the English under Lord Thomas Butler sustained a severe defeat from them near Mullingar in West Meath. Richard, duke of York, lord-deputy in the reign of Henry VI., erected castles along the border of Meath and other counties in order to repress them. The Irish chieftains

appear to have levied a tribute upon the English settlers, in consideration of leaving them in quiet, similar to the black mail levied by the Scotch Highland chieftains upon the neighbouring Lowland lairds and tenantry. The county of Meath paid at one time a yearly pension to the O'Connors of 60*l*.

In the reign of Henry VIII., when the power of the English began to revive, Meath was invaded by an Irish chieftain, Con Buckah O'Niall, or O'Neal (A.D. 1520); but he quickly withdrew on the approach of the earl of Surrey, lord-deputy. In a rising in favour of the Papacy, which took place at the Reformation, the Irish broke into Meath, destroyed Navan, and, after mustering their forces at Tarah Hill, set out to return home, but were overtaken and entirely routed (A.D. 1539). In A.D. 1540 the natives assembled in West Meath, with a view to break into the English pale; but dispersed on learning that preparations had been made to resist them. Just at the close of the reign of Henry VIII., the antient county of Meath was divided; and West Meath, including the present counties of West Meath and Longford, and part of King's County, was erected into a separate county. Cavan, which was partly formed out of Meath, was erected into a separate county by Sir John Perrot, lord-deputy in the reign of Elizabeth. In the great rebellion of 1641, Meath was again the scene of hostilities. Trim was entered by the English troops, who designed to make it a military post; and an attempt of the Irish to surprise the garrison was defeated by a bold and successful sally (A.D. 1642). Sir Charles Coote, one of the best officers of the English, and commander of the garrison, fell in the action. In 1643 negotiations for peace between the English and the insurgents were carried on at Trim. In 1647 Trim was besieged by the insurgents under their general Preston, who, having learned that Col. Jones, the parliamentary governor of Dublin, was on his march to relieve the place, set out in order to surprise the capital, but was met on the road and entirely defeated. Trim served as a place of retreat to some of the Royalists on their defeat at Rathmenes near Dublin, in 1649: but after the storming of Drogheda, and the massacre of the garrison by Cromwell in the same year, Trim was surrendered by the Royalists without resistance.

In the war of the English revolution the battle of the Boyne was fought (A.D. 1690) close upon the border of this county, between Drogheda and Slane. The two armies subsequently crossed the county from north to south, that of James in retreat, that of William in pursuit. In the rebellion of 1798 some outrages were committed at Dunboyne by a party of insurgents, who were very shortly defeated at Ratoath; but the victors having separated, the vanquished party rallied and cut off part of them at Clonee Bridge. Some further outrages were committed at Dunshaughlin, and immediately a considerable part of the population of the county rose in rebellion: a body of men, 4000 according to some accounts, took post on Tara Hill, where they were defeated with considerable slaughter by the troops and yeomanry. Part of the fugitives took refuge in the bogs, from which they continued for three weeks to make excursions for plunder and devastation.

There are several remains of antiquity in the county. At Tarah, or Taragh, once the seat of the Irish monarchs, are considerable earthworks. Two splendid torques, or collars of pure gold, were dug up here in 1813. There are considerable ruins of the castles of Scurlogstown, Dunmoe, Athlumley, and Asigh. Slane Castle and one or two others have been fitted up as residences. There are round-towers at Kells and at Donoughmore near Navan. There are numerous ruins of antient monastic edifices: those of the monastery at Duleek, supposed to be the most antient monastic edifice built of stone and mortar in Ireland, present some remarkable traces of rude architecture. The front of the antient cathedral at Clonard yet exists, and there are several stone crosses. The ruins of Bective Abbey are extensive and picturesque.

(Wakefield's *Ireland; Parliamentary Papers*; Harris's *Hibernica*; Gordon's and Cox's *History of Ireland*.)

MEATH, WEST, or as it is sometimes written in one word, **WESTMEATH**, is an inland county of the province of Leinster in Ireland, bounded on the north by the county of Cavan in Ulster, from which it is separated by Lough Sheelin or Shillin; on the north-east, east, and south-east by the county of Meath; on the south by King's County; on the west by the county of Roscommon in Connaught, from which it is separated by Lough Ree and the river Shannon; and on the north-west by the county of Longford. The greatest length is, from east-north-east to west-south west, from the county of Meath near Clonmellon, to the bank of the Shannon opposite Athlone, 45 miles; the greatest breadth, at right angles to the length, is from the neighbourhood of Kinnegad to that of Rathowen, both on the mail-road from Dublin to Sligo, 25 miles. The area is estimated in the Population Returns for 1831 at 370,053 English statute acres, or 578 square miles. The population in 1831 was 136,872, giving nearly 237 inhabitants to a square mile. In area it can scarcely be compared with any English county; it is larger than Monmouthshire, and less than Hertfordshire; in amount of population it is rather below Hertfordshire, but in density rather exceeds it.

Surface, Geological Character, and Hydrography.—The county is for the most part a gently undulating surface, not rising in any part to a very great height. Knock Eyne, or Ion, on the border of Loch Deveragh, is about 850 feet high; Benfore, or Ben of Fowre, near the village of Fowre, not far from Lough Lane or Lene, is 760 feet high. These, with the other principal elevations, are in the northern part of the county. The whole belongs to the central carboniferous limestone district of Ireland. There are two small districts, one just round Moate-a-Grenogue, and the other in the same neighbourhood, but rather more to the south-west, which are occupied by the yellow sandstone, a formation consisting of quartzy sandstone conglomerate, of varying grain, which passes into sandstone. These beds are considered to belong to the same period as the carboniferous limestone, of which series of formations they constitute the lowest members.

The western side of the county belongs immediately to the basin of the Shannon, which forms its western boundary, separating it from the county of Roscommon. Lough Ree, the largest of the series of lakes into which that river expands, is also on the western border. This noble sheet of water is 15 miles long from north to south, and of a varying breadth, above 7 miles in one part. Its outline is exceedingly broken and irregular, and its surface studded with a number of small islands finely wooded. Those adjacent to Westmeath are, Innismore, or Inchmore, containing 104 acres, once the site of a monastery; Hare Island, 57 acres, with the ruins of an abbey; Innisturk, or Inchturk, 24 acres; and Innisboffin, or Inchboffin, 27 acres, formerly the site of an abbey; besides a number of smaller islands. An inlet at the southern extremity of Lough Ree, connected with it by a straight so narrow as properly to constitute it another lake, is almost entirely enclosed within the county. This subordinate lake, which is about two miles long from east to west, and in one part above a mile and a half wide, contains a large island called Friar's Island, well wooded at its western extremity. The streams which flow into the Shannon or into Lough Ree are all small. Two of the principal rise about 3 miles west of Moate-a-Grenogue; one of them flows in a circuitous channel north-west into the inlet of Lough Ree; the other flows due west into the Shannon near Long Island, below Athlone. Another stream, which rises three miles north of Moate, and several other streams in the north-west, flow into the Inny, which joins Lough Ree on the border of the county of Longford. There are several small lakes on this side of the county; some of these communicate by small streams with Lough Ree; others have no visible outlet. Bogs also are numerous, though none of them are of any great extent.

The central part of the county is drained by streams that empty their waters into several inland lakes, which are connected by small streams with each other, and ultimately with the river Shannon. The northernmost of these is Lough Sheelin, or Shillin, on the north border of the county, from which lough a small stream communicates with Lough Keinal, also on the border. From Lough Keinal the connecting stream flows southward, first along the border, separating West Meath from Longford, and then through the county into Lough Deveragh. This fine sheet of water extends 5 or 6 miles in length from north-west to south-east, and has a breadth varying from 2¼ or 3 miles near the north-west end, to little more than a quarter of a mile near the south-east extremity. The banks are hilly, and some of the loftiest elevations in the county are in the surrounding district. There are plantations or other woodlands on some parts of the shore. The district north of the Lough, extending as far as Lough Keinal and Lough Shillin, is almost entirely bog, especially the tract through which the

connecting stream flows. Lough Deveragh receives some small streams; and others, including the Glore, which is the outlet of a small lake (Lough Glore), north-east of Lough Deveragh, fall into the connecting stream.

From the north-western extremity of Lough Deveragh another stream flows south-west into Lough Iron, a shallow lake of about 3 miles long from north-west to south-east, and about half a mile broad. Several streams flow into the connecting stream between Lough Deveragh and Lough Iron or into the latter lake, and carry off the superfluous water of small lakes or bogs. Lough Glyn on the north-west border toward Longford, and Lough Gar, are thus connected with this central system.

A small brook forms the communication between Lough Iron and Lough Owhel, or Hoyle, 3½ miles long from north-west to south-east, and about 1¼ miles broad. The banks rise gently from the lake, and are fertile and well wooded. On a small islet in the lake is a rude chapel with a burial-ground, once much resorted to by pilgrims. A supply of water is drawn from Lough Hoyle for the Royal Canal. From Lough Hoyle a small stream flows in a winding channel southward past Mullingar into Lough Ennel, 4½ or 5 miles long from north-east to south-west, and above 2 miles broad at the widest part. This lake, sometimes called Belvidere, is studded with small islands. A number of streams flow into this lough.

These lakes communicate with the Shannon by two different streams. The Inny flows from the north-western extremity of Lough Iron to the border of the county, which it skirts, and then into the county of Longford, to which it may be considered as chiefly belonging. It flows into Lough Ree. The Brosna flows from the south-west extremity of Lough Ennel by Kilbeggan into King's County, to which it chiefly belongs. It receives a number of small streams, drains the southern parts of the county, and falls into the Shannon in the neighbourhood of Banagher.

All that part of the county which we have described is included in the basin of the Shannon, though for convenience the central lake-district has been described separately. The eastern side of the county belongs to the basin of the Boyne. A number of small streams rise on that side of the county and flow eastward into that river: the most important is the Deel, one branch of which rises near Mullingar, and another is the outlet of a small system of lakes near the north-east border of the county. The lakes of this system are Lough Bawn, the White Lake, and some very small ones on the borders; and Lough Lene, Lein, or Lane, and Lough-a-Deel within the border: Lough Lene, the largest of the group, is about 2¼ miles long from west-north-west to east-south-east, and nearly a mile broad. Its waters are peculiarly clear, and it contains several islets.

The eastern and south-eastern sides of the county abound with bogs, and some of them are of very considerable extent. The lakes of West Meath abound in pike and trout: the latter are very fine, and form an important article of food.

This county is among the most picturesque in Ireland. It is considered to be excelled only by Kerry, Fermanagh, Wicklow, and Waterford.

Agriculture.—The landed estates in the county are not very large, but there are a number of gentlemen of moderate fortune. In the eastern parts the soil is a heavy loam from 7 to 12 inches deep; the northern parts, which are hilly and adapted for sheep-walks, are chiefly devoted to grazing black cattle. In the western parts the soil is generally light; there is a great deal of bog. The farms do not commonly exceed 100 acres or thereabouts, and in many cases are as small as 15, 10, 7, or even 3 acres. The resident gentry usually farm a considerable portion of their own estates. The average rent of arable land is from 1*l.* 5*s.* to 1*l.* 10*s.*; land of good quality will sometimes let for 2*l.*, that of inferior quality sometimes for not more than 1*l.* The system of 'con acres,' or lands let to the cottiers for the purpose of growing a single crop of potatoes, is prevalent in almost all parts of the county. (*Appendix to the Report of Commissioners for Inquiring into the State of the Irish Poor.*) The chief crops raised by the farmer are oats and potatoes; a very little wheat, some barley, flax, rape, and clover are grown. Fences, except in the neighbourhood of demesnes, are generally neglected; in some parts they consist simply of earthen banks without anything growing upon them. Dairy farming is practised to some extent in this county, but not to such an extent as the nature of the soil would warrant. A considerable quantity of good butter is made, which is sent by Dublin to England. The long-horned cattle are much valued; some of the best specimens are grazed in this county, and all the stock participate in the blood. Sheep are not a favourite stock, but there are some excellent ones of the long-woolled breed. Pigs, as usual, are generally kept. The breed of horses is superior; many are brought from Connaught and reared for sale in Dublin. Wood is not plentiful; there are some small copses and underwoods, the remains of antient forests; and some thriving young plantations. The following table shows the sales of grain in the years 1826 and 1835:—

Market.	Barrels of Wheat of 20 Stone. 1826.	1835.	Barrels of Oats of 14 Stone. 1826.	1835.	Barrels of Barley of 19 Stone. 1826.	1835.
Mullingar . .	None	None	7800; average of these and the intermediate years.		4500; average of these and the intermediate years.	
Clonmellon . .	markets not established	200	markets not established	5,000	markets not established	None
Castletown Delvin	markets not established	300	markets not established	900	markets not established	None.
Ballinacargy .	None	300	28,000	25,000	2,500	2,500
Coolnahea . .	None	None	2,000	1,800	350	250
Rathowen . .	400	50	4,000	2,000	150	None.
Moate	Average from 1826 to 1830			4,800		
,,	Average from 1831 to 1836			4,900		

No return was received from the markets of Castle Pollard and Kilbeggan. No wheat appears to have been sold at Moate either in the years 1826 and 1835 or in the interval between them. Collinstown is not noticed. The name Coolnahea in the tables is, we suspect, an error. We know not with what place to identify it.

The manufactures of the county are not important; they consist chiefly of the most necessary articles. The returns of 1831 give 285 adult males as engaged in manufacture, 92 in that of linen (chiefly coarse), 22 in that of cotton, 20 in that of friezes and other woollens, chiefly coarse, and 2 in the silk manufacture. The remainder were not specified. To these must be added 820 weavers, returned among the retail tradesmen and handicraftsmen; but what fabric they produced is not stated.

Communications.—The Shannon is navigable for steam-boats conveying goods and passengers, or acting as steam-tugs to other vessels, throughout that part which borders on this county. The Royal Canal, which connects Dublin and the east coast with the upper part of the Shannon at Tarmonbarry, crosses this county from east to north-west, passing near Killucan and Mullingar. A branch from the Grand Canal between Philipstown and Tullamore in King's County, to Kilbeggan, is partly in this county.

The principal roads are those from Dublin to Longford and Athlone respectively. The Longford road enters this county from that of Meath near Kinnegad, and runs north-west by Mullingar and Rathowen into the county of Longford. A branch from this at Mullingar takes a rather more westerly direction from Ballinacargy to Ballymahon. The Athlone road branches from that to Longford just after it enters the county at Kinnegad; and runs westward by Rochford Bridge, Tyrrell's Pass, Kilbeggan and Moate, to Athlone. The road from Dublin to Granard runs through the northern part of the county by Castle Pollard. The principal traffic is carried on by the canals and by the Athlone road; but the number of passengers is rather the greatest by the Longford and Athlone roads. Many however travel by the Royal Canal to Mullingar, and by the branch of the Grand Canal to Kilbeggan.

Divisions, Towns, &c.—West Meath is divided into 12 baronies, whose relative situation and amount of population are as follows:—

		Population in 1831.
Brawney. . .	W. . .	7,396
Clonlonan. . .	S.W. .	12,830
Corkaree. . .	Central. .	6,630
Delvin. . . .	E. . .	9,984
Demifore, or Half Fowre.	N. .	15,559
Farbill. . . .	E. . .	8,746
Fartullagh. . .	S.E. . .	8,903
Kilkenny West. .	W. . .	11,159
Moyashel and Magheradernan, or Magheradernon.	Central. .	12,732
Moycashel. . .	S. . .	16,167
Moygoish. . .	N.W. .	11,702
Rathconrath. .	N.W. .	15,064
		136,872

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Population.

Date.	How ascertained.	Inhabited Houses.	Families.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort .	13,693	..	..	..	..	..	..	69,000
1813	Under Act of 1812 . .	no return	..	..	..	..	..	..	no return
1821	Under Act 55 Geo. III., c. 120	23,478	..	..	..	..	..	..	128,042
1831	Under Act 1 Will. IV., c. 19	23,803	25,331	16,824	3,694	4,813	67,700	69,172	136,872

The county town is Mullingar; the parliamentary borough and market-town of Athlone is partly in this county, partly in that of Roscommon; and there are the market and post towns of Kilbeggan, Moate, Rathowen, Castletown-Delvin, Ballinacargy, Clonmellon, and Castle Pollard (of these Kilbeggan is a corporate town); the market-town of Collinstown; and the post towns of Kinnegad, Ballymore, Tyrrell's Pass, Killucan, Rochfort Bridge, and Drumcree. Athlone is described elsewhere. [Athlone.]

Mullingar is in the barony of Moyashel and Magheradernan, but the parish extends into that of Fartullagh; it is nearly 50 miles from Dublin by Maynooth, Clonard, and Kinnegad. It was one of the towns founded by the English settlers of Meath. In the war of the Revolution the town was fortified by General Ginkel, and became the rendezvous of William's army, preparatory to the siege of Athlone. The town is surrounded on three sides by the Royal Canal, and consists of a principal street, about half a mile long, and some smaller ones. The number of houses in 1831 was 727 for the town, or 1538 for the whole parish. Those in the town are chiefly of stone. The church is a tolerably spacious building, erected in the present century, with a handsome tower and spire. There are a handsome Catholic chapel and one or two Dissenting meeting-houses. The county court-house is convenient; there are a county gaol, erected within the last few years, and an older prison, now used only for females; a county infirmary, an hospital, barracks for a thousand men, and a neat and commodious market-house in the centre of the town. The population of the town of Mullingar in 1831 was 4295, that of the whole parish 8845. The assizes for the county, the quarter-sessions for the division, and petty-sessions for the district, are held, and a portion of the county constabulary have their station here. The Royal Canal gives the town the benefit of water-carriage; and considerable business is done at the market (which is held on Thursday) in corn, butter, and frieze coating. There are four yearly fairs for cattle; one of them is a considerable horse-fair. The town is not incorporated; but a charter of King Charles II. granted to the lord of the manor several privileges, and to the freeholders the privilege of sending two members to parliament; this last was abolished at the Union. The living is a vicarage in the diocese of Meath, and in the patronage of the crown. The parish is at the head of a Catholic union.

Kilbeggan is in the barony of Moycashel, 56 miles from Dublin, on the road to Athlone. It was the scene of a conflict in the rebellion of 1798 between a party of insurgents and the regiment of Northumberland militia. The town contains 350 houses; the whole parish 732: half of those in the town are well built, and have slate roofs. The church was originally part of an antient monastic institution, dissolved at the Reformation. There are a handsome Catholic chapel and a Methodist meeting-house. The market-house is a neat building. The population in 1831 was 1985 for the town, or 4039 for the whole parish. The trade of the town is considerable: distilling, brewing, milling, and snuff-making are carried on; much butter is sold at the market, which is held on Saturday, and there are four yearly fairs. A branch from the Grand Canal recently made bids fair to increase the prosperity of the town. Kilbeggan was incorporated by James I.; the corporation consists of a portreeve, twelve burgesses, and an unlimited number of freemen. The portreeve has jurisdiction in the borough conjointly with the county magistrates. There is a borough court for the recovery of debts; petty sessions for the district are held here. The town formerly sent two members to the Irish parliament, but was disfranchised at the Union. The living is a perpetual curacy; the parish is, in the Catholic arrangements, united with an adjoining one.

Moate-a-Grenogue is in the barony of Clonlonan, 66 miles from Dublin, on the road to Athlone. In the war of the English Revolution a party of the Jacobites were defeated here by William's army under General De Ginkel, and compelled to flee to Athlone. The town consists almost entirely of one street, and comprehended, in 1831, 304 houses, the greater part slated, the rest thatched. The population of the town in 1831 was 1785. The trade of the place appears to be diminishing; the manufacture of cottons and linens has much declined, and several breweries and distilleries have been discontinued. There is a market on Thursday, one of the most important for oats in the county; and there are several yearly fairs. The quarter-sessions for one division of the county are held here, and also petty sessions for the district. There is a convenient court-house and a small bridewell attached to it. A party of the county constabulary have their station here. The town is in the two parishes of Kilcleigh and Kilmanaghan, chiefly in the former, the parish church of which is in the town. There are a Catholic chapel and several dissenting places of worship; also a dispensary.

Rathowen is in the barony of Moygoish, 64 miles from Dublin, on the Longford road, and 13 or 14 miles from Mullingar. The town contained, in 1831, a parish church, a Catholic chapel of the union in which the parish is concluded, a market-house, and 107 houses, almost all thatched. The population was 605 for the town, or 2170 for the whole parish of Rathaspect, in which it is situated. There is a market on Tuesday, chiefly for oats, and two fairs in the year. It is one of the stations of the county constabulary.

Castletown Delvin is in the barony of Delvin, 50 miles from Dublin. An old castle, built here by De Lacy, lord of Meath, was for a time the residence of the Nugents, who built also the castle of Clonin or Clonyn in the parish. Of the castle built by De Lacy the ruins remain: the walls form a quadrangle with towers at the corners. There are several other castellated ruins in the neighbourhood. Clonin was burnt during the civil war of Charles I. on the approach of Cromwell. The name of Clonyn is retained by the present residence of the marquis of Westmeath. The town consisted in 1831 of a single street of 77 houses, with a population of 419. There are a parish church, a plain old building, but in good repair, and a Catholic chapel. The market lately established is on Friday, and there are three fairs in the year. Petty-sessions are held, and a body of the county constabulary have their station here. The living is a vicarage in the diocese of Meath. The parish is at the head of a Catholic parochial union. There is a dispensary.

Ballinacargy, or Balnacarrig, is in the barony of Moygoish, 58 miles from Dublin. The town had, in 1831, 46 houses, neatly built and roofed with slate. It is in the parish of Kilbixy, and the Roman Catholic chapel for the parish is in the town. There are a market on Wednesday, the largest in the county for oats and barley, and a market on Saturday for provisions; also two yearly fairs. Petty-sessions are held here, and the town is one of the stations of the county constabulary. There are a dispensary and a free school.

Clonmellon is in the barony of Delvin, close upon the border of the county. It is a neat little town, comprehending, in 1831, 179 houses, and a population of 960. There are a considerable corn-market on Tuesday, lately established, and two yearly fairs. Petty-sessions are held, and a portion of the county constabulary are posted here. The parish church of Killua, in which parish the town is situated, is near the town; it is a neat building, with a spire.

Castle Pollard is in the barony of Demifore, 54 miles

from Dublin, about 2 miles north-east of Lough Deveragh, and about the same distance west of Lough Lane. It consists of five streets meeting in an open space or square, in which stands the market-house. It contained, in 1831, 291 houses, and a population of 1618. The parish church of Rathgarrue, or Rathgarth, or Rathgraff (in which parish the town stands), a modern building, is not far from the town. The tower and part of the old church, with the churchyard, in which is the school-house, are also near the town. There are a Catholic chapel, a dispensary, a fever hospital, a savings'-bank, and a parochial school. There are a market on Wednesday and four yearly fairs. Petty-sessions are held, and a party of the county constabulary have their station in the town. Kinturk, the seat of the Pollard family, Pakenham-hall, the seat of the earl of Longford, and other demesnes, are near the town. The old castle of Kinturk, which gave name to the town, is entirely demolished.

Collinstown is a little place on the road from Dublin to Granard. It is at the junction of four roads forming a cross, and has only twenty or thirty houses, chiefly thatched, with a market-house in the centre of the town, and a Roman Catholic chapel near it. It is in a pleasant district of diversified scenery, near the southern extremity of Lough Lane. There are a market on Saturday and two yearly fairs. There are petty-sessions held, and a body of the county constabulary posted in the town. The town is in the parish of St. Feighan of Fowre.

Kinnegad is in the barony of Farbill, about 11 miles from Mullingar, and 37 from Dublin. It is in a great thoroughfare, just at the separation of the roads from Dublin to Longford and Athlone, and consists of one principal street. It has 123 houses, with a population of 670. The church is a neat Gothic building of modern date; there are a Catholic chapel, a school-house, and a market-house. No market is held, though there is a charter for one, and there is only one yearly fair. The living is a perpetual curacy detached from the parish of Killucan.

Ballymore is in the barony of Rathconrath, 15 miles from Mullingar, and 73 from Dublin. There formerly existed here a monastery for Premonstratensian canons and Benedictine nuns, who occupied different portions of the same building. The church of this monastery was for a short time the cathedral church of the diocese of Meath. In the civil war of 1641 Ballymore was a principal military station of the English; and in the war of the Revolution the Irish were posted here, until beaten from the town by General De Ginkel. A garrison of a thousand men in Fort Ballymore, in an island of the neighbouring Lough Shodie or Scudie, surrendered themselves prisoners of war shortly after. The town, which is partly in Killure parish, but chiefly in that of Ballymore, consisted, in 1831, of 121 houses, chiefly small houses or cabins, forming one long street. There are a parish church and a Catholic chapel. There was formerly a market, but it is now discontinued. There are two yearly fairs. Petty-sessions are held, and the county constabulary have a station in the town. Not far from the town is a round tower, the only remains of a castle, said to have belonged to the De Lacys.

Tyrrell's Pass is in the barony of Fartullagh, about 51 miles from Dublin, on the road to Athlone. The town takes its name from having been for many years the seat of the Tyrrell family. There are some remains, near the town, of their castle. The town consists of about 80 houses, chiefly well built, with slated roofs, forming one principal street. There is an area in the centre of the town, formerly used as a market-place, but the market is now discontinued. The parish church of Clonfadd (in which parish the town is partly situated) and a Methodist meeting-house are in the town. There are a savings' bank, a charitable loan fund, and a dispensary. There are two cattle fairs, which are well attended.

Killucan is in the barony of Farbill, 42 miles from Dublin. It takes its name from an abbey founded by St. Lucian, the church of which subsequently became parochial. The De Lacy family had a castle here, of which the foundations and some of the outworks are still discernible. Four yearly fairs are held in the town; petty sessions are also held, and there is a station of the county constabulary. The town had, in 1831, 29 houses and 206 inhabitants; the whole parish 1491 houses. The parish church is a modern structure. There are in the parish two Catholic chapels, four public schools, and a 'flax society,' which gives employment to about 100 poor women.

Rochfort Bridge, or, as it is sometimes called, Beggar's Bridge, is in Fartullagh barony, and about 47 miles from Dublin, on the road to Athlone. It contained, in 1831, only 27 houses and 171 inhabitants. The parish church of Castlecost, in which the place stands, and a national school, are in the town. The county constabulary have a station here.

Drumcree is in Delvin hundred. It contains the parish church of Kilcumney (in which parish the town is), a parish school-house, and a dispensary. It had, in 1831, 37 houses and 197 inhabitants.

The village of Fore or Fowre, or, more accurately, of St Feighan of Fowre, is in the barony of Demifore, not far from Lough Lane. Though now only a small village, it was antiently of importance. A monastery for regular canons was founded here in the seventh century, and is said to have contained, a few years after its foundation, 3000 monks. This monastery, after having been repeatedly destroyed by fire, was re-founded in the beginning of the thirteenth century by Walter de Lacy, for Benedictine monks. There are still some remains of the abbey, and there is an antient and massive building, supposed to have been a hermitage. In the fifteenth century considerable pains were taken to fortify the town, which had acquired the privileges of a corporate borough. There are the ruins of several square towers, two of the gates, and traces of the town wall, the extent of which shows its former size. Fowre was a borough by prescription, and returned two members to the Irish parliament, until it was disfranchised by the Union. The village had, in 1831, 19 houses and 119 inhabitants.

Ecclesiastical and Legal Divisions.—The county is almost entirely in the diocese of Meath; a small portion on the north-west side is in the diocese of Ardagh, which was till lately held by the archbishop of Tuam, but is now to be permanently united to the diocese of Kilmore. Both Kilmore and Meath are in the ecclesiastical province of Armagh.

West Meath is included in the home circuit: the assizes are held at Mullingar, where are the county court-house and gaol. Quarter-sessions for the county are held at Mullingar and Moate-a-Grenogue, where are a court-house and a bridewell.

West Meath returned ten members to the Irish parliament, two for the county, and two each for Mullingar, Athlone, Kilbeggan, and Fowre. At present it returns three to the Imperial parliament, viz. two for the county, who are elected at Mullingar, and one for the borough of Athlone.

The police force of the county, on the 1st of January, 1836, consisted of 1 magistrate, 7 chief constables, including sub-inspectors (viz. 4 of the first and 3 of the second class), 50 constables, and 222 subconstables, with 9 horses. The expense of maintaining the constabulary for 1835 amounted to 10,051*l.* 4*s.* 9*d.*, of which 5480*l.* 16*s.* was chargeable against the county.

The county gaol at Mullingar has lately experienced a very extensive change for the better. A commencement has been made of the system of instruction in trades. But the discipline of the female side still requires very much attention: the accommodation is very insufficient, and there is no classification. There are two schools in the prison, and a tread-mill for those sentenced to hard labour. The Moate bridewell is on a tolerably large scale, with every accommodation requisite for classifying the prisoners, and is clean and well kept. (*Appendix to Fourteenth and Fifteenth Reports of Inspectors-General*, 1836.)

The number of committals for criminal offences in 1836 was, for offences against the person, 282 (of whom 184 were convicted, 98 acquitted or discharged); for offences against property committed with violence, 43 (20 convicted, 23 acquitted or discharged); for offences against property committed without violence, 164 (112 convicted, 52 acquitted or discharged); for malicious offences against property, arson, &c., 22 (8 convicted, 14 acquitted or discharged); for forgery and offences against the currency, 7 (2 convicted, 5 acquitted or discharged); for other offences, 243 (226 convicted, 17 acquitted or discharged): making a total of 761 persons committed, of whom 552 were convicted and 209 acquitted or discharged. Only one person was executed. Of the persons committed, 633 were males (5 of them under sixteen years) and 128 females (2 under sixteen); 342 could read and write, 118 could read only, and 296 were

entirely ignorant. Of 5 the degree of instruction they had received could not be ascertained.

The Lunatic Asylum for the counties of West Meath, King's, Queen's, and Longford, is at Maryborough, in Queen's County: of 131 patients in this institution on the 1st of January, 1837, 28 belonged to this county. The county infirmary is at Mullingar. There were, in the year 1833, a fever hospital at Castle Pollard, and fourteen dispensaries in different parts of the county, supported in equal proportions by grand jury presentments and private contributions.

History and Antiquities.—This county was included in the kingdom of Meath, of which it formed the western division. In common with the rest of that kingdom it suffered severely both from the ravages of the Danes and from civil dissensions, and was included in the county palatine of Meath, granted by Henry II. of England to Hugh de Lacy, one of the Anglo-Norman barons who assisted in the reduction of the county. [MEATH.] It was the scene of frequent hostilities for several centuries between the native Irish, who were not entirely expelled or subdued, and the English, and was, for above a century before its formation into a separate county, in a state of anarchy, in which the English laws ceased to be observed. West Meath was separated from Meath or East Meath in the 34th of Henry VIII.; at its first separation it included Longford, which was not detached from it and formed into a separate county until the reign of Elizabeth. King's County, which was partly taken from West Meath, had been formed A.D. 1557, in the 5th of Philip and Mary.

The great insurrection of 1641 is said to have been planned and agreed upon at the abbey of Multifarnham in this county, which being much resorted to for religious purposes, and therefore less liable to suspicion, was chosen by the conspirators as their place of meeting.

In 1648 Athlone, in which the partisans of Renunccini, the papal nuncio and head of the extreme Catholic party, had endeavoured to maintain themselves, was taken by the confederate royalists under Lord Clanrickarde and General Preston.

In the war of the English revolution West Meath was the scene of some important operations. [ATHLONE.] An extensive change of the landed property of the county resulted from the confiscations which followed these wars. The older families have disappeared almost entirely from the grand-jury list.

In the Rebellion of 1798 the county was but little disturbed, though many of the peasantry had furnished themselves with pikes. In September of that year, during the invasion of Ireland by the French detachment under General Humbert, the insurgents assembled and joined those of the neighbouring counties in an attempt to seize Granard, in which they were repulsed. They were put down by a subsequent defeat at Brumbrusna, near Multifarnham.

There are many vestiges of antiquity scattered through the county. There are numerous ruins of antient castles, including some erected by the De Lacys. Sonnagh Castle, one of these, stands on the verge of a small but picturesque lake. Of monastic buildings there are several ruins; and some churches, formerly conventual, are still used for divine worship by Catholics or Protestants.

(Wakefield's *Ireland*; *Parliamentary Papers*; Harris's *Hibernica*; Gordon's and Cox's *History of Ireland*.)

MEATH, DIOCESE OF. Several small bishoprics (of which the principal were Duleek, Clonard, Kells, Trim, Ardbraccan, Dunshaughlin, Slane, and Fowre) gradually coalesced into one see, which, at the end of the twelfth century, received the name of Meath, and was further augmented, A.D. 1568, by the addition of the bishopric of Clonmacnois. The diocese comprehends nearly the whole of the counties of Meath; West Meath; a considerable part of King's County; small portions of Cavan, Longford, and Kildare; and part of the county of the town of Drogheda. It extends in length from east to west from the sea to the Shannon, 80 English miles; and has a medium breadth from north to south of 25 English miles. There is no cathedral; neither are there a dean and chapter. The only dignities are the deanery of Clonmacnois and the archdeaconry of Meath. The want of a chapter is supplied by a synod, of which every incumbent is a member, and the archdeacon president. The diocese is included in the province of Armagh: it is not affected by the Act 3 and 4 William IV., c. 37. The bishop has precedence of all the other Irish bishops. His residence is at Ardbraccan near Navan.

The number of parishes is given by Dr. Beaufort (1792) at two hundred and twenty-four, and part of another; the number of benefices at ninety-nine; and of churches at seventy-seven. In 1834 the number of parishes was two hundred and twenty; of benefices, one hundred and five; of which forty-seven were unions of two or more parishes; of churches, one hundred; of other episcopal places of worship six; of Presbyterian meeting-houses, three; of other Protestant dissenting places of worship, eighteen; and of Catholic chapels, one hundred and fifty-six: giving a total of two hundred and eighty-three places of worship of all denominations. The population of the diocese in 1834 was 404,059; of whom 377,562 were Catholics, 25,626 members of the Establishment, 672 Presbyterians, and 199 other Protestant dissenters.

There were at the same time 578 daily schools, in which were 28,885 children under instruction, being in the proportion of 9·05 per cent. to the whole population of the diocese: in the relative number of children under instruction as compared with the population, Meath ranks twelfth among the thirty-two dioceses of Ireland. Of the above-mentioned schools, 45 were in connection with the National Board. (*First and Second Reports of the Commissioners of Public Instruction in Ireland.*)

The lands belonging to the see comprise 29,269 statute acres, of which 20,266 are of profitable land. The average yearly revenue of the bishopric, for the three years preceding 1832, was 5220*l.* 10*s.* 6*d.*

There is a Roman Catholic bishopric of Meath. The bishop is a suffragan of the Roman Catholic archbishop of Armagh. There were in this diocese, in 1834, 66 parish priests, including the bishop, who officiates at Mullingar, where is the cathedral, a handsome and spacious Gothic edifice of modern erection; and 60 coadjutors or curates.

MEAUX, a town in France, capital of an arrondissement in the department of Seine et Marne. It is on the bank of the Aube, 23 miles in a direct line east by north of Paris, or 27 miles by the road.

The original name was Latinized as Iatinum; and it was the capital of the Meldi, a Celtic people who were included in the Roman province of Lugdunensis Quarta or Senonia. Toward the overthrow of the Roman empire, Iatinum assumed the name of Meldi, whence the modern Meaux. In the early history of the Franks it was a place of considerable consequence. It was included in the possessions of the counts of Champagne, and was united to the domains of the crown by the marriage of Philippe IV. le Bel, A.D. 1284, with the countess of Champagne. It was one of the places in which the reformed faith early met with a favourable reception; but it afterwards came into the hands of the League, from which it revolted to join Henri IV. It was the chief town of Brie Champenoise.

The town is divided by the Marne into two unequal parts, and the canal of the Ourcq passes by the foot of its antient walls, which have been planted with trees and converted into promenades. The streets are not well laid out, but the houses are tolerably good. The principal building is the cathedral, commenced in the eleventh century. The architecture is Gothic; the magnificent choir contains a marble statue of Bossuet, who was bishop of this see. There are two parish churches and a Protestant church. The Palais de Justice, or court-house, was built by the antient counts of Champagne. There are good barracks for cavalry. The population in 1831 was 8481 for the town, or 8537 for the whole commune; in 1836, 7809 for the commune. The inhabitants manufacture cottons, leather, glue, saltpetre, vinegar, and earthenware; and carry on a considerable trade in corn, especially oats, sent to Paris, flour, cheese (called from the district Brie cheese, and accounted very excellent), wool, cattle, poultry, wood, and coal. The old bridge across the Marne, from the great fall of the water which the bridge causes, impedes the navigation, which is carried on here by a very antient navigable cut, called the Cornillon Canal. There is a well-attended weekly market, and there are four yearly fairs. There are a subordinate court of justice, and a court for commercial suits; several government offices, two hospitals, two seminaries for the priesthood, a high school, a Protestant Bible Society, a public library of 11,000 volumes, another library at the bishop's palace, a museum, and a society of agriculture, science, and arts.

Meaux is the seat of a bishopric, established in the fourth century, and now having for its diocese the department of Seine et Marne. The bishop is a suffragan of the archbishop of Paris.

The arrondissement of Meaux has an area of 463 square miles: the population in 1831 was 93,417; in 1836 it was 90,965. It is subdivided into seven cantons or districts, each under a justice of the peace, and comprehends 161 communes. Millstones and marble are quarried in it; and there is a considerable stratum of gypsum in the neighbourhood of Meaux.

MECCA. [ARABIA.]

ME'CHAIN, PIERRE-FRANÇOIS-ANDRE', was born 16th August, 1744, at Laon, a town of France, in the present department of Aisne. After quitting the school 'des ponts et chaussées,' where the limited means of his parent had enabled him to pursue his studies only for a short time, he engaged himself as mathematical tutor, and devoted his leisure to the cultivation of astronomy. Shortly after this an accident brought him under the notice and patronage of Lalande. The necessity of affording some pecuniary assistance to his father obliged Mechain to dispose of an astronomical instrument which, by rigid economy, he had recently been able to purchase. Lalande became the purchaser, and, after acquainting himself with the past history of Mechain, procured for him a government appointment as hydrographer, in which he was engaged in the construction of marine charts, and, jointly with M. Bretonnière, in the survey of the French coast between Nieuport and St. Malo. His attention however appears to have been chiefly directed to the theory of eclipses, and of comets, of which he discovered eleven, and computed the orbits of twenty-four. To his memoir on the comet of 1532, which it was expected would re-appear in 1789 or 1790, the prize of the Academy of Sciences was awarded, and the same year (1782) he was admitted a member of that society. In 1791 the National Convention having determined upon employing the length of the arc of the meridian comprised between Dunkirk and Barcelona as the basis of their new measures, the measurement of the southern portion of this arc, between Rodez and Barcelona, was, at the recommendation of the Academy, confided to Mechain. The northern portion was allotted to M. Delambre, to whose account of the entire survey (*Système Métrique*, Paris, 1806-7-10, 3 vols. 4to.), containing many interesting particulars relative to Mechain, we refer the reader. It will be sufficient here to state that Mechain experienced his share of the difficulties and annoyances which have usually attended such operations, and that the breaking out of the French revolution, which prevented his return from Spain, and the consequent anxiety for his family whom he had left behind, brought upon him a melancholy state of mind from which he never wholly recovered. His skill as an observer is particularly mentioned by Delambre, and also the accuracy of all his calculations connected with the survey. Of this Mechain himself was unconscious. He had employed the repeating circle, an instrument which he regarded as absolutely infallible, and finding a difference of three seconds between his observations at Barcelona and Montjouy, he attributed it wholly to his own incapacity. Upon his return to Paris, which he reached with much personal risk, fearing to divulge this discrepance, he refused to deliver his papers to the Academy. The subject continuing to prey upon his mind, he applied, after several years, to the French board of longitude, and urged them to prolong the measurement of the arc from Barcelona to the Balearic Islands. To this the Board consented, but being unwilling to dispense with his services at the Paris Observatory, they suggested that Mechain should not be the conductor of the survey. This however would have been to relinquish the chief object of his application. He obtained permission to depart, but soon after his arrival in Spain he was attacked by an epidemic disorder, of which he died on the 20th of September, 1805, at Castellon, a town of Catalonia.

Before his departure he entrusted all the manuscripts referring to his previous expedition to M. Delambre. They have since been arranged and deposited in the Paris Observatory, together with so much of his correspondence as related in any way to the survey.

His published works are few. They consist of papers printed in the 'Connaissance des Temps,' subsequently to 1785, in which year he succeeded Jeaurat as editor of that ephemeris, and several memoirs in the Transactions of the French Institute, commencing with the year 1782. These memoirs refer chiefly to the cometary theory and eclipses.

(Delambre's Notice of the Life of Méchain, in the *Biog. Univers.*; Hutton's *Mathematical Dictionary*, &c.)

MECHANICS is the science in which are investigated the actions of bodies on one another, either directly or by means of machinery.

These actions may be simple pressures without motion; as when one body being supported in any manner, another is placed upon it, either vertically or in some oblique position: or they may be such as are accompanied by motion, and these may arise either from the mutual attractions which all bodies in nature exercise upon each other, or from the collisions of bodies in motion with others which may be previously in motion or at rest.

The term is particularly applied to the mutual actions of solid bodies: the actions of fluids on solids form, in part, the subjects of hydrostatics and hydrodynamics; but these, as well as pneumatics, are now frequently included under the general name mechanics. When bodies are at rest and the actions are such as to maintain them in that state, the laws of the actions constitute that branch which is called statics; but when motion is concerned, the laws and phenomena constitute what is called dynamics.

In all the branches of general mechanics the investigations are founded on experiment and are conducted by geometrical or algebraical processes; hence the science forms one of the departments of experimental philosophy, and also of mixed mathematics: this last denomination is applied to mechanics because in the latter are involved several qualities of bodies which do not enter into the researches of pure science, such as mass or quantity of material, inertia, hardness, elasticity, time, space, and power or force. The last-mentioned term is used to express the cause of the actions of bodies on one another: but we have no other conception of it than that it is productive of motion or of a tendency to motion; or that it arrests an actual motion or renders a tendency to motion ineffectual. When opposing forces act on a body so as to destroy each other's effects and keep the body unmoved, that body is said to be in a state of equilibrium; and this state is distinguished from that of mere rest, since the latter implies the absence of any cause by which the body might change its place.

The invention of simple machines for moving masses of any material which it might be beyond the unaided power of man to transport to a distance, must have taken place in the earliest ages of the world. Human ingenuity would readily suggest the application of a rod or bar of wood or iron, for the purpose of lifting a heavy body from the ground; and very little experience would suffice to show that rolling or pushing a block of stone up sloping ground was a much easier operation than that of raising it vertically by the strength of men's arms. Thus may have arisen the employment of the lever and inclined plane; and from these, subsequently, the wheel and axle, the pulley, the wedge, and the screw were derived. The simple means here indicated would be sufficient, with the aid of manual labour, to build up the most massive cyclopean edifice; and even the vast materials which form the roofs of the Egyptian temples may have been raised to their places by means of inclined planes, formed of earth for the purpose, on the exterior of the walls, and afterwards removed.

The steps by which the art of constructing machines advanced have not been distinctly recorded; and the work of Vitruvius on architecture is almost the only source from whence can be obtained an account of such as were in use in and before the time of that engineer (the age of Augustus or Vespasian). From the descriptions there given it appears that among the mechanical powers then in use were the lever, the windlass, and the assemblage of pulleys. Vitruvius also mentions some ingenious contrivances for transporting heavy blocks of stone from the quarries, and a forcing-pump, the invention of which he ascribes to Ctesibius, for supplying the public fountains. He describes a complex machinery, consisting of wheels driving each other by cogs or teeth, which was applied to carriages or ships for the purpose of measuring the distances travelled or sailed; and he enters fully into the construction of engines for throwing darts or masses of stone. The muscular strength of men was then employed as a moving power in turning mills: wheels impelled by river currents acting on floatboards (pennæ) gave motion to machinery for grinding corn; and wheels turned by men walking on them were

used for raising water by buckets or otherwise. Vitruvius generally mentions the names given by the Greeks to the machinery; and it might, without great risk of error, be presumed that much of that which he describes was in u among the latter people at, or even before, the time when the Parthenon was raised. There are no distinct intimations of the existence of windmills till the twelfth century. The expansive force of steam can only be said to have become a moving power at the end of the seventeenth century, and then it was employed merely to raise water. Its general application to machinery must be dated from the year 1768.

In tracing the progress of discovery concerning the mathematical theory of mechanical action, we shall have little to notice till we come to the sixteenth century; for the antients, who devoted themselves with so much ardour to the researches of pure science, almost entirely neglected the application of the latter to subjects which appeared to them to terminate in mere practical utility. It must be observed however that Aristotle, who left no department of nature untouched, has noticed, in his mechanical questions, the equilibrium of unequal weights on the unequal arms of a balanced lever, though he gives a very unphilosophical reason for the fact. But in his 'Physics' he states correctly that if two forces move with velocities reciprocally proportional to their intensities, they will exert equal efforts: this may apply to a well-known property of the lever, but it may have been meant to refer only to the effect of two unequal bodies moving with unequal velocities, and striking each other or a third body.

Sicily enjoys the honour of having given birth to the first philosopher who can properly be said to have been a theoretical mechanician: we allude to Archimedes, who died about 212 B.C., and in whose works there is direct evidence of an effort to determine the principle of equilibrium in machines. Commencing, in the treatise whose Latin title is 'De Æquiponderantibus,' with the axiom that two equal weights balance each other on a lever (of uniform dimensions), when at equal distances from the fulcrum, he supposes the weights to be divided into an equal number of equal parts, and that the parts are removed to equal distances from the point of support; observing then that the equilibrium still subsists, he proceeds, by the method of exhaustions, to show that it always will take place provided the bodies are inversely proportional to their distances from the fulcrum. Archimedes thence concludes that there must exist in every one body, considered as an assemblage of smaller bodies, a centre of force (that is, a centre of gravity) corresponding to the fulcrum in the former case; and he proceeds, by the analysis of that day, to investigate the seat of the centre of force in a triangle, a parabola, and a paraboloid.

This philosopher has obtained eternal celebrity by the contrivances which he is said to have adopted for the defence of Syracuse. No precise account is given of the machinery which he employed to raise up and destroy the galleys of the enemy, and the effects are probably exaggerated. The vessels must have been close to the walls, and it is conceivable that, by hooks at the ends of chains which were suspended from levers on the ramparts, the rigging, or some parts of the turrets erected as usual on the decks, in order to enable the assailants to pass over the parapets, might be caught; then, the levers being raised by the force of men or otherwise, the vessels or the turrets would be easily overturned.

During about 1800 years, which elapsed between the time of Archimedes and that of Cardan, we have no other notices concerning the theory of mechanics (beyond those which occur in the writings of the former mathematician), than such as are contained in the 'Mathematical Collections' of Pappus, which amount merely to a statement that the antients had reduced the theory of every machine to that of the lever, and an unsuccessful attempt to explain the cause of the equilibrium of a body on an inclined plane. It is remarkable moreover that both Cardan and, subsequently, the marquis Ubaldi (the latter of whom published, in 1577, a treatise in which he explains at length the combinations of pulleys, and reduces their theory to that of the lever) should also have given erroneous solutions of the problem concerning that equilibrium. The discovery of the true theory of the inclined plane was however, about the same time, made by Stevinus, a native of Flanders. This mathematician and engineer supposed a chain of uniform dimensions to be placed on a doubly inclined plane, having a common summit and base, the chain being perfectly free to slide on the planes, and its ends hanging vertically to equal distances below the base; then, in order to prove that the chain would remain at rest, he shews that if any motion should take place, it might continue for ever; and this he concludes to be absurd. As the argument holds good when one of the two planes is in a vertical position, Stevinus infers that, when a body is in equilibrio upon a plane, the retaining power is to the weight as the height of the plane is to its length; and he further shows that if three forces act on any point, they hold the latter in equilibrio when they are proportional to the three sides of a triangle formed by lines drawn parallel to the directions of the forces. It should be remarked however that Stevinus demonstrates the law in that case only in which two of the forces are at right angles to each other. He died in 1635.

To Galileo we are indebted for the first reduction of mechanical propositions to purely mathematical formulæ. In order to demonstrate the equilibrium of a body on an inclined plane, he imagined the weight and the sustaining power to be applied to the ends of a bent lever whose arms were of equal length and perpendicular to the vertical and slant sides of the plane; then reducing the lever to a straight one, between the lines of direction of the weight and power, it was easy to prove that the forces in equilibrio on the plane were also in equilibrio on the lever, and were to one another as the length to the height of the plane.

But the most important discoveries of Galileo were those which relate to the times of descent, the spaces descended, and the velocities acquired when bodies fall by the action of gravity. He made observations on the motions of pendulums, and determined that the times of their vibrations are proportioned to the square roots of their lengths; he also gave theorems for the composition of two motions, when both are uniform, when both are accelerated, and when one is uniform and the other accelerated. Nor should we omit to state that he was the first to obtain expressions for the strength of materials in resisting the strains to which they are subject. It deserves notice moreover that Galileo, in opposing the arguments of one of his contemporaries concerning the law of the descent of bodies by gravity, makes a supposition that the spaces descended with the accelerated motion may be divided into equal parts, each so small that the motion during the time of describing it may, without sensible error, be considered as uniform; an hypothesis corresponding exactly to that which, agreeably to the principles of the modern analysis, is now employed in investigations concerning variable motions.

The theory of the motions of fluids was, apparently, first cultivated in Italy by Castelli, who wrote on the subject in 1638; and about the same time Torricelli, having discovered the existence of a space void of air in the upper part of a tube filled with mercury, its open end being immersed in a vessel of that fluid, was enabled to refute the antient notion that nature *abhorred* a vacuum. The latter was subsequently led to the conclusion that the pressure of the atmosphere is the cause of the support of a column of mercury in a tube, and also of the ascent of water in pumps. Both of these writers were pupils of Galileo; and, soon after the time of this philosopher, the French mathematicians Descartes, Pascal, Fermat, and Roberval, prosecuted with ardour the new science, as that of mechanics was called. Among the fruits of their researches may be named the determination of the centres of oscillation and percussion in a body or system of bodies vibrating about a fixed axis. The impulse given by Galileo, being thus continued by a succession of men of talent both in Italy and France, caused the science to advance with an accelerated movement, and soon put it in a condition to embrace all the subjects of terrestrial physics.

The mechanics of that age was not however entirely emancipated from the trammels of a false philosophy; and the theory of Descartes, concerning the communication of motion when bodies strike each other, is remarkable on account of the metaphysical principle which it involves. In speaking of the collision of bodies, he gives as a reason why the same momentum should exist after as before the impact, that it depends on the divine immutability. God having created a certain quantity of motion to serve as the cause of all the operations of nature, that quantity, he conceives, can never be increased or diminished. Yet there is some reason to think that Descartes had better notions con-

cerning the phenomena of collision, for he states correctly, in one of his letters, that the motion of a body when it strikes another which is at rest becomes divided between the two masses, and that the resulting velocity is diminished as the mass is augmented. The chief feature in the physics of Descartes is his supposition that the planets revolve about the sun in vortices of æther, the particles of which, having acquired a certain degree of centrifugal force, act on the planets and prevent them from falling together in the centre of the system. He supposed that the like vortices surround each planet; but the particles of æther, having less specific gravity than the bodies on the surface of the planet, the tendency of these bodies to that surface prevails over the force by which the æther causes them to recede from thence.

The laws of the collision of bodies, which had been in vain attempted by Descartes, were at length, and nearly at the same time, discovered by the English mathematicians Wallis and Sir Christopher Wren, and by Huyghens on the Continent. The first of these, in his treatise 'De Motu' (1670), divides bodies into such as are hard and such as are elastic, and he explains the phenomena attending the shock of bodies of both kinds. In that of hard bodies he adopts as an hypothesis that the body struck destroys as much motion in the striking body as the latter communicates to it; and in elastic bodies he considers the forces of compression and restitution to be proportional, in each, to the velocity before the shock. The name of Huyghens is become celebrated from the discovery of the properties of cycloidal curves, and the attempt to make the lower extremity of a clock-pendulum vibrate in an arc of that kind, in order that the times of vibration might be equal, whatever were the extent of the arc described. This attempt did not succeed; but, being led in the course of his inquiries to investigate the position of the centre of oscillation in a compound pendulum, Huyghens found that when several pendulous bodies descend by gravity and afterwards re-ascend by the acquired velocities, in whatever way they may act upon each other, their common centre of gravity cannot rise higher than the point from whence it descended. This proposition is considered as proved from the fact that, if it were otherwise, the centre of gravity might by mechanical means be made to rise continually higher, and thus perpetual motion might ensue: but this is impossible.

In 1687 Newton's great work concerning the mathematical principles of natural philosophy was first published, and from that time the mechanical sciences, which had hitherto been confined to the action of bodies on each other at the surface of the earth, were made to comprehend the laws of planetary motion. The 'Principia,' as the work is called, commences with the three well known axioms in philosophy, or laws of motion. Assuming then as an hypothesis, that all the bodies of the universe and all the particles of every body exert on each other mutual attractions; assuming also that the planetary bodies were originally put in motion by impulsive forces; the rotations of these bodies on their axes, their revolutions in their orbits, and all the perturbations by which their movements are varied, are explained by means of the elementary theorem for the composition and resolution of motions. The oscillations of pendulums, the theory of projectiles, the movements of fluids, and the resistance opposed by the latter to the motions of bodies immersed in them, are also in the same work investigated at length.

Contemporary with Wallis, Wren, and Newton in England, were, on the Continent, the celebrated Leibnitz and the two elder Bernoullis, all of whom contributed greatly to the advancement of mechanical science by their investigations concerning the laws of motion in terrestrial bodies: and to the rivalry as well as the talents of these great men we owe some of the most important discoveries in that branch of learning. At this time the fluxional or differential calculus was discovered, and had acquired an algorithm; and they who adopted its principles appear to have been anxious to show its superiority over the antient geometrical analysis, by proposing to their opponents problems which could scarcely be solved by the latter method. With some such views Leibnitz proposed the determination of that curve along which a body descending would describe equal vertical spaces in equal times; James Bernoulli proposed to find the figure assumed by a flexible cord or chain when suspended at the extremities [CATENARY]; and John Bernoulli, to find the curve of swiftest descent. [CYCLOID.] Numerous other problems of the like nature were given out among the parties, and the solutions could not fail, if no other benefit arose, of carrying the new calculus to a considerable degree of perfection.

From the time of Newton mechanical science was, till lately, but little cultivated in this country; but on the Continent a succession of illustrious men continued to prosecute the investigation of subjects connected with it, and by the employment of analytical processes they rendered comparatively easy the application of its principles to the researches of physical astronomy.

The mathematicians who may be considered as the immediate successors of Newton were chiefly Euler, D'Alembert, and Clairaut; and in the works of the first of these are investigated all the circumstances attending the phenomena of rectilinear and curvilinear motion when a body in vacuo or in a resisting medium is subject to any forces whatever. But the most remarkable event in the history of the sciences, after the discoveries of the English philosopher, was the solution of the celebrated problem of the three bodies; or that whose object is to determine the motions of a body when attracted by and revolving about another, and continually disturbed by the attraction of a third. This was, at the same time (about 1752), and independently of each other, accomplished by the three learned men above named, and it now constitutes the basis of the whole planetary theory. The 'Mécanique Analytique' of La Grange, which was published in 1788, and the 'Mécanique Céleste' of La Place (1798 to 1825), contain the last accessions which the mechanical sciences have since received; and these sciences now comprehend the laws of force or motion, from the properties of the simple lever to the phenomena of the heavenly bodies.

It may have been seen above that the first general principle in mechanics is that of the equilibrium of bodies on a lever: and a knowledge of it may be ascribed to Archimedes. The extension of the principle to all the mechanical powers was long an unsolved problem, and the solution may be said to have been first made known to the world by the discovery of Stevinus relating to the sustaining power on an inclined plane. A second general principle may be conceived to be that of the composition of motions or forces; and its discovery is to be ascribed to Galileo. Daniel Bernoulli (about 1726) was the first to demonstrate the rule of the composition of forces independently of motion; but the application of the principle as a means of obtaining general equations of equilibrium seems to have been first made in the 'Projet d'une Nouvelle Mécanique,' which was published by Varignon in 1687.

La Grange treats as a third principle in mechanics that of *virtual velocities*. By this is meant those which bodies in equilibrio would have at the first instant of their motion, in the event of the equilibrium being disturbed. Indications of this principle are found in the writings of Galileo, Wallis, and Descartes, but John Bernoulli is thought to have been the first who showed its utility in resolving statical problems. [VIRTUAL VELOCITIES.] A general method of solving mechanical propositions was discovered by D'Alembert, and it may be thus enunciated. If there be impressed on bodies motions which they are forced to change in consequence of their mutual actions, those motions may be considered as compounded of the motions which the bodies do really take, and of those which are destroyed. Whence it results that these last must be such that if they alone existed the bodies would be in equilibrio. In order to avoid the decompositions of motions which this principle requires, an equation is frequently made between the general analytical expression for a force and the expression for those forces which produce the observed motions. [FORCES, IMPRESSED.] The manner of estimating the value of a mechanical force is various; and a difference in the expression of the value gave rise to disputes which continued during nearly all the first half of the eighteenth century. [FORCE.]

Besides the principles above mentioned there occur in mechanical investigations several others, which it will be proper to state briefly in this place.

That which is called the *preservation of living forces* is a consequence of the discovery of Huyghens concerning the movement of the centre of gravity in a compound body. For the space described by that centre is expressed by the quotient arising from the sum of the products of the mass of each body into the distance it passes over, divided by the

sum of the masses; and since the spaces descended by bodies when acted on by gravity are proportional to the squares of the velocities, it follows that the sum of the products of the mass of each body into the square of its velocity is constant, whether the bodies move jointly in any manner, or whether they descend freely through equal vertical spaces.

The preservation of the centre of gravity is a principle which contains the discovery of Newton, that the motion of the common centre of gravity of several bodies is not affected by the mutual attractions of the bodies. It was subsequently extended by D'Alembert, who shows that if the bodies are solicited by a constant accelerative force in directions either parallel to each other or tending to a fixed point, the centre of gravity must describe the same line as if the bodies were free.

The preservation of areas seems to have been discovered simultaneously by Euler, Daniel Bernoulli, and the Chevalier D'Arci, about 1750. According to the latter it is an extension of Newton's theorem that the radii vectores of revolving bodies describe equal areas in equal times, and it consists in this: that the sum of the products of the masses of revolving bodies into the areas described by their radii vectores about a fixed point is proportional to the time. Or the sum of the products of the masses into the velocities and into the perpendiculars let fall from the fixed point on the lines of direction of the motions is constant.

The principle of least action originally signified, that when bodies act on each other, the sum of the products of the masses into the velocities and spaces described is a minimum. But considered in the most general sense, agreeably to the extension given to it by La Grange, the principle consists in this: that in trajectories described by bodies subject to central forces, the integral of the velocity multiplied by the element of the orbit is always a maximum or a minimum.

A general outline of that part of mechanics which relates to the equilibrium of solid bodies is given under the word STATICS; and the details of the subjects may be seen under LEVER, WHEELS, &c. The part of mechanics which relates to bodies in motion appears under the words referred to in the article DYNAMICS.

MECHELEN, called Malines by the French, is a large well-built town in the province of Antwerp, in 51° 2′ N. lat. and 4° 29′ E. long. It stands in a fertile plain on the river Dyle, by which it is intersected. The streets are wide, well paved, and kept remarkably clean. The large square, called La Place d'Armes, and the market-place, are in particular deserving of mention. The cathedral, dedicated to St. Rombaud, the patron saint of Mechelen, is the most remarkable building in the town. Its tower is 348 feet high, and contains a fine peal of bells: it was built in 1451. The other principal buildings are the arsenal, which contains a cannon-foundry; the town-house, the archiepiscopal palace, and the church of the Jesuits. Mechelen contains a college, an academy of painting, a society of fine arts, and a large building which serves as an asylum for 800 widows and aged women.

It appears that as early as the fifth century Mechelen was the capital of a lordship, which was afterwards given in 754 by Pepin to one of his relatives. It was subsequently destroyed by the Normans, and rebuilt in the year 890. In 910 it was ceded by France to the bishop of Liège. At this time it occupied only the left bank of the Dyle, but was extended on the other side of the river in 970. Mechelen was sacked by the Spaniards in 1572, and by the army of the Prince of Orange in 1578. It was taken in 1706 by the Duke of Marlborough; and by the French in 1746, but was restored at the peace of Aix-la-Chapelle. In 1792 it was again taken by the French, who in 1804 destroyed its fortifications.

This town is the seat of an archbishopric, created in 1559 by pope Paul IV. The archbishop is the head of the Catholic church in Belgium, and has for his suffragans the bishops of Namur, Tournay, Aix-la-Chapelle, Trèves, Ghent, Bruges, Liège, and Mayence.

Mechelen carries on an important trade by means of vessels of considerable burthen, which ascend the Schelde and the Dyle at high-water, the influence of the tide being felt a few miles above this town. The principal articles of commerce are corn, oil, hemp, flax, and hops. The lace manufactured at Mechelen has long been in high repute, and bears a great price. There are manufactories of hats, shawls, coarse woollens, and paper, cotton-mills, dye-houses, breweries, distilleries, and tanneries. It has recently acquired additional importance from the circumstance of its being the central point at which the several railroads of Belgium meet. It is about midway between Brussels and Antwerp, and distant from both about thirteen miles. The population of Mechelen in 1836 was 22,895. (Van der Maelin's *Dictionnaire Géographique de la Province d'Anvers*.)

MECHLIN. [MECHELEN.]

MECHLOIC ACID. This acid was formed in 1835 by Couerbe, by passing chlorine gas over fused meconin. When purified by solution in potash, and precipitation from it by nitric acid, it exists in the state of colourless prismatic crystals, soluble in cold water, but more so in hot: alcohol and æther dissolve it sparingly. It melts at about 257°; at 376° it is volatilized; and by a strong heat it is decomposed. It is stated by its discoverer to be composed of

Chlorine	5·43
Organic matter	94·57
	100·

The organic matter consists of

Hydrogen	4·070
Carbon	49·404
Oxygen	46·526
	100·

MECKLENBURG, which consists of the two grand-duchies of Mecklenburg-Schwerin and Mecklenburg-Strelitz, is situated in Northern Germany, between 53° 8′ and 54° 2′ N. lat., and 10° 40′ and 13° 45′ E. long., and is bounded on the north by the Baltic, on the east by the Prussian provinces of Pomerania and Brandenburg, on the south by Brandenburg and the Hanoverian principality of Lüneburg, on the west by Lauenburg and the territory of Lübeck. The area (according to Hempel) is 5880 square miles, namely, Mecklenburg-Schwerin 4788, and Mecklenburg-Strelitz 1092. The greatest extent of Mecklenburg, from north to south, or from the peninsula of Fischland to the great Wentower Lake, is 94 miles, and the greatest breadth, from east to west, 127 miles.

Divisions.—Mecklenburg-Schwerin is divided into circles or districts. I. *Mecklenburg* (251,476 inhabitants): chief towns, Schwerin, the capital (13,035 inhabitants); Parchim (5690 inhabitants); Ludwigslust, the residence of the grand-duke (nearly 5000 inhabitants). II. *Wenden* (140,482 inhabitants): chief town Güstrow (8620 inhabitants), one of the handsomest towns, and the fourth in size in the grand-duchy. It was for many centuries the residence of the princes, and has several remarkable public edifices, especially the cathedral, which contains some costly monuments of the princes; the palace, which Hempel says is unquestionably the finest princely residence of the middle ages in Mecklenburg, was converted in 1817 into a house of correction. III. *The Principality of Schwerin:* chief town Bützow (3600 inhabitants). IV. *The District of Rostock:* chief town Rostock (29,000 inhabitants). V. *The Lordship of Wismar* (11,420 inhabitants): chief town Wismar (10,000 inhabitants). [SCHWERIN; ROSTOCK; WISMAR.]

Mecklenburg-Strelitz is divided into, I. *The Lordship or Circle of Stargard* (69,762 inhabitants): chief towns, New Strelitz (5767 inhabitants); New Brandenburg (6000 inhabitants); Friedland (4500 inhabitants); Old Strelitz (3090 inhabitants). II. *The Principality of Ratzeburg*, lying quite detached from the grand-duchy, on the frontier of Lauenburg and the lake of Ratzeburg, near Lübeck (14,080 inhabitants). [STRELITZ; RATZEBURG.]

The surface of the country, being a part of the low land of Northern Germany, may be described generally as a plain. There is a ridge or chain of hills which, commencing in the Silesian mountains, traverses the country, and extends in a north-west direction into Holstein. On both sides of this ridge there is some heath, moor, and sand, but a great portion of the land is fertile, and in parts covered with considerable forests. The soil is partly loamy and heavy, partly of a middling quality, and partly sand. The first, which is about one-third of the whole, is very fertile; the second is of very different degrees of quality; the last is everywhere poor, and frequently covered with heath. In Mecklenburg-Schwerin there are sixty-two lakes at least 1¼ miles long,

besides many smaller ones. Lake Müritz, which is the largest, is 18 miles long and 8 broad. In Mecklenburg-Strelitz the county of Stargard alone contains fifty-three lakes at least 1¼ miles long: the largest is the Tollen Lake, 7½ miles long. Some of the rivers fall into the Baltic, and others into the Elbe. Of the former the principal are the Trave, Stepenitz, Recknitz, Peene, and Warnow; the last is one of the chief rivers; the length of its course is about 100 miles. At Rostock it suddenly expands to a breadth of 2400 feet, and falls into the sea at Warnemunde. The Elbe only washes the frontier at two places, near Dönitz and Boitzenburg, which lie on its banks. The rivers that fall into the Elbe are, the Elde, which has a course of above 100 miles, and the Havel. The coast of the Baltic, which is but little indented, is generally steep, and high above the sea; and where it is lower, the country is protected from the incursions of the sea by sand-hills. Though Mecklenburg, on the whole, is not a picturesque country, there are some spots of very pleasing appearance about many of the lakes, especially Lake Malchin, and near the sea-coast. The climate is healthy and temperate; but the weather is variable, and the winter often very cold.

Natural Productions.—Agriculture is the chief employment of the inhabitants. Wheat (most of which is exported), rye, barley, oats, peas, and vetches are very abundant. The forests produce oak, beech, and fir timber of excellent quality. There is a good breed of horses, horned cattle, and sheep, which are highly esteemed in other countries. Swine too are abundant. In some parts there is much game, such as wild boars, stags and deer, bustards, partridges, snipes, wild geese, and ducks. The geese of Mecklenburg are celebrated for their size and good quality. Fish abound both in the sea and all the lakes. The country is poor in minerals, and no mines of any kind are worked.

Trade and Manufactures.—The manufactures are inconsiderable, but they are improving, and great pains are taken to promote the woollen manufacture. Favourably situated as the country is between the Baltic and the Elbe, its commerce is far more important than its manufactures, yet by no means so extensive and profitable as might be expected; for the laws allow the importation and exportation of almost all articles, and the duties are low. The vicinity of Hamburg and Lübeck, and the heavy duties imposed by the Prussian tariff, are great checks on the trade of Mecklenburg. The *Revenue* of Mecklenburg-Schwerin is considerable, amounting to 2,017,000 rix-dollars per annum, of which nearly 1½ millions are produced by the domains. The revenue of Mecklenburg-Strelitz is stated at 400,000 rix-dollars, but is probably higher, for the domains alone yield 300,000 rix-dollars.

Religion and Education.—The great majority of the inhabitants are Lutherans. There are in Mecklenburg-Schwerin 4000 Jews and 590 Roman Catholics, and in Mecklenburg-Strelitz 800 Jews and 50 Roman Catholics. The Calvinists are only 250 in both states. The sovereigns are the heads of the church. There appears to be a very inadequate religious instruction, since, according to Hempel (the most recent and the best authority), there are in Mecklenburg-Schwerin 461 Protestant churches with only 322 officiating clergy, and in Mecklenburg-Strelitz 150 churches with 68 clergymen. Education was formerly very much neglected. The schools for the people were few and ill conducted. The learned institutions were better, and the university of Rostock has had many eminent professors. Considerable improvements were made by duke Frederick, who in 1782 founded a seminary for schoolmasters; but a thorough reform was left for his successor Frederick Francis, who during his long reign devoted his unceasing attention to this object. The improvement in Mecklenburg-Strelitz has been equally great. The university of Rostock has only about 120 students.

The military force of Mecklenburg-Schwerin is 3298 men, and that of Mecklenburg-Strelitz 742 men. Their contingents to the army of the Confederation exceed their ordinary establishment, that of Mecklenburg-Schwerin being 3580, and a reserve of 1740 men, and that of Mecklenburg-Strelitz 718 men and a reserve of 359 men. Both form part of the second division of the 10th corps of the army of the Confederation. Their respective contributions to the treasury are 1333⅓ florins and 666⅔ florins. In the full council Schwerin has two votes and Strelitz one; in the select council they have together one vote, viz. the 14th.

Form of Government.—The co-operation of estates in the affairs of the country may be traced to the remotest periods. The constitution, in its present form, is founded on compacts entered into between the princes and the estates in 1523, 1572, 1621, and especially on that of 1755. The grand-dukes have the whole executive power; but share with the estates the legislative power and the right of imposing taxes. The grand-dukes indeed govern their respective dominions independently of each other, but the estates of the two grand-duchies are inseparably united by a compact made in 1523, called the Landes-Union. The clergy, formerly the first estate, having been excluded after the Reformation, the assembly has since consisted of two estates: the first is called the equestrian order, which includes all the owners of noble estates (whether they are noblemen or not). They have great privileges and immunities, and are rich and powerful. There are now 572 landowners who have seats and votes in the assembly. The second estate consists of the deputies of the forty-four towns. They meet annually at Sternberg and Malchin alternately. In general above 200 members attend. The grand-duke alone has the right of introducing such measures as he deems necessary, which is done by what are called 'propositions.' The estates have the right to accept or reject them, and they may likewise represent what they consider as grievances, and petition for their being remedied.

The history of the country is rather intricate, in consequence of the frequent changes in the reigning family by the formation of new branches and the extinction of others, which occasioned continual partitions of the territory. Mecklenburg was inhabited by the Heruli and the Vandals. On their emigrating to the south they were succeeded by Sclavonian (Wendish) tribes, of whom the most powerful were the Obotriti, to whose prince Heinrich Burewin, son of Pridislaus (who had embraced the Christian religion), Henry the Lion gave his daughter Matilda. Pridislaus was declared in 1170 a prince of the empire, and was the ancestor of the succeeding sovereigns of Mecklenburg. These princes received the ducal title from the emperor Charles IV. in 1340, and assumed that of grand duke on joining the German Confederation in 1815.

(Hassel: Stein; Horschelmann: and chiefly Hempel, *Geog. Statist. Hist. Handbuch des Mecklenburger Landes*, Güstrow, 1837.)

MECONIC ACID, a substance which is found only in opium, in which it exists in combination with the alkali morphia. It was first noticed by Seguin in 1804, and a few years after, more particularly described by Sertuerner, who named it *mecon* (*μήκων*), poppy. Meconate of lime is one of the results of a peculiar process for obtaining morphia from opium: this is put into ten times its weight of water at 200°, and hydrochloric acid is added until it is dissolved; the solution is to be filtered, and on cooling it deposits bimeconate of lime in the state of light, scaly, or acicular crystals; these are again to be dissolved in hot and very dilute hydrochloric acid, which separates the remainder of the lime, and on cooling, the meconic acid crystallizes. They are to be freed from colouring matter by subsequent treatment, and meconic acid has then the following properties: it acts on litmus paper, and has a sour taste: it is soluble in four times its weight of water, and also in alcohol. The crystals do not alter by exposure to the air, but when heated to 212° they lose 21·5 per cent. of water, and become opaque. Although when heated even to near 250° the acid is not totally decomposed, yet the boiling solution gives out carbonic acid gas, and a brown substance is formed which is metameconic acid. When strongly heated, it is totally vaporised and decomposed. When mixed with a solution of chloride of gold, and heated, it is decomposed, and metallic gold is precipitated; this acid possesses the characteristic property of forming a purplish-red coloured solution with the persalts of iron, and this is regarded as one of the best tests of its presence, and also of that of the opium from which it is derived.

According to Liebig, meconic acid consists very nearly of

Two equivalents of Hydrogen	.	2
Seven equivalents of Carbon	.	42
Seven equivalents of Oxygen	.	56
Equivalent		100

The salts which contain this acid are called *meconates* we shall briefly state the properties of the more important of them:—*Meconate of Ammonia* crystallizes in quadri-

lateral prisms, dissolves in one and a half times its weight of water, yields water when heated, and afterwards sublimes without decomposing. *Meconate of Potash* crystallizes in tables and leaves, contains water of crystallization, and is soluble in twice its weight of cold water. *Meconate of Soda* crystallizes in fine needles, which contain much water of crystallization, and are soluble in five times their weight of water. *Meconate of Lime* forms acicular crystals, which contain water of crystallization, and are soluble in eight times their weight of water. When the acid is in excess the salt crystallizes in prisms, and is difficultly soluble in water. *Meconate of Magnesia* when neutral is only slightly soluble, but the supersalt dissolves readily; it crystallizes in flattened needles, which are brilliant and transparent, and have an acid and bitter taste. *Meconate of Barytes* is slightly soluble in water. *Meconate of Iron* is a colourless and very soluble salt, which becomes red by exposure to the air, and more rapidly by the addition of nitric acid. The *Permeconate of Iron* is also a soluble salt, and is of a fine red colour, which is destroyed by heat, by sulphurous acid, and protoxide of tin: the remaining metallic meconates are not important.

Metameconic Acid.—It has been above mentioned that when a solution of meconic acid is heated to ebullition, that carbonic acid is evolved, and a brownish solution results; this consists of colouring matter and metameconic acid. When a meconate, as of potash or lime, is boiled with hydrochloric acid, no colouring matter results, and yet metameconic acid is formed.

This acid is soluble in sixteen times its weight of boiling water, and separates on cooling in hard anhydrous grains, which, like the meconic acid, redden the persalts of iron, but they differ from it in every other respect.

It is formed by the mere separation of carbonic acid, by subtracting one equivalent of which from meconic acid we obtain the acid in question:—

		H.	C.	O.
Meconic acid	.	2	7	7
Carbonic acid	.		1	2
		—	—	—
Metameconic acid	.	2	6	5

Its saline combinations have been but little examined.

Pyromeconic Acid is obtained by heating meconic acid, which yields about one-fifth of its weight. It is purified by pressure between folds of blotting paper, and crystallization from solution in water. It is fusible between 248° and 257°, and then flows like oil; it is entirely soluble at a moderate temperature, and is more soluble in alcohol even than in water. It turns the persalts of iron red, and its salts are generally soluble in water. It is formed by the separation of four equivalents of carbonic acid and one equivalent of water, from two equivalents of meconic acid, thus:

		H.	C.	O.
Two equivalents of Meconic acid	.	4	14	14
Four equivalents of Carbonic acid	.		4	8
One equivalent of Water .	.	1		1
		—	—	—
Pyromeconic acid	.	3	10	5

MECONIN, a neutral principle existing in opium, first noticed by Dablane, and more particularly examined by Couerbe. To obtain it, an infusion of opium, from which the morphin has been precipitated, is to be evaporated, and the crystallized matter, obtained after being pressed, is to be treated with boiling alcohol; the solution contains narceia and colouring matter, from which it is to be separated by subsequent operations.

The properties of meconin are, that it is colourless, inodorous, is at first tasteless, but afterwards acrid; it is soluble in water, alcohol, and æther, and crystallizes well in any of them; the crystalline form is a six-sided prism with dihedral summits; it fuses at 194°, and is volatilized at 310°, without undergoing any change of properties. It is soluble in about 265 parts of cold water, and 20 of boiling water. Sulphuric acid gives it a fine green colour, while nitric acid by its action converts it into a peculiar crystalline matter. Chlorine renders it of a blood-red colour, forming mechloic acid. It does not act either as an acid or an alkali.

According to Couerbe it consists of—

Four equivalents of hydrogen	4	or	4·44
Nine equivalents of carbon	54		60·00
Four equivalents of oxygen	32		35·56
	—		—
	90		100·

MEDAL. Numismatists have usually given the name of medals to those coins that have been struck or cast for particular purposes and on extraordinary occasions, in commemoration of victories, treaties, coronations, and similar important events, or in honour of remarkable persons; in distinction to those which have been issued and generally circulated as money.

The words *medaglia* and *medaglione* first occur in Italian writers, from whom the English and French have evidently taken their *medal* and *medaille*. The derivation seems to be from the Greek μέταλλον (metal); of which medals are always made.

A reference to medals, in connection with numismatics, has been made in the article on coins [COIN], to which a few observations must now be added respecting them independently of their relation to the general subject.

Though we have proof in the specimens that have reached our times that the antients were not less successful in the medallic than in the other arts of design, it does not appear that works of this class were sought after and preserved with the care bestowed on productions of the sister arts. None of the classic writers give any account of collections of medals and coins among the Greeks, and it is not until a somewhat late period that we find any distinct notice of a taste for them arising in Italy. Augustus, according to Suetonius, was the first who showed any interest in the subject; he was in the habit of presenting to his friends medals of foreign countries and princes as valuable marks of his favour.

Greek medals and medallions are very rare, few being known of earlier date than the establishment of the Imperial power at Rome, and when Greece was under Roman dominion. Some of Sicily are not however so scarce; they are of very fine design and workmanship, and deserve the careful attention of the connoisseur. The design of the finest of these is a head, usually of Ceres, with spoils in the exergue, and on the reverse a Victory crowning a figure in a car. Many of great excellence and in high preservation are contained in our collection of coins in the British Museum. The Roman medallions differ from the Greek (we mean in this place Greek medals of the Imperial periods) in their greater substance or thickness. Those from the time of Julius Cæsar to Hadrian are very scarce, and are, in consequence both of their rarity and their quality, of high value. The larger bronze medallions of the antients are often of exquisite workmanship, and the devices are uncommon. Some are composed of two sorts of metal; the centre being of copper, with a border or ring of compound metal running round it, or *vice versâ*, the copper being the outside ring. It often happens that the inscriptions on these medals extend over both the metals.

Among the peculiarities which distinguish modern from antient medals may be mentioned the introduction of portraits of illustrious characters who were not of princely or regal houses. It is remarkable that while busts are found of many celebrated poets, historians, and philosophers of antiquity, their portraits never occur on medals. When, after the long interval of darkness in which literature and art were enveloped, from the decline of the Roman empire to the seventh or eighth century, taste began again to appear, and, with the other arts, die-engraving revived, it was employed in transmitting to posterity the portraits of eminent individuals. Petrarch seems to have been the first who, in modern times, made coins subservient to the illustration of history and biography. The emperor Charles IV. had expressed a wish that he would write the lives of eminent men, and would place him among them. Petrarch boldly told the prince he would do so whenever his life and conduct merited it. It was after this that he presented to Charles a collection of gold and silver coins bearing the representations of distinguished men. Pinkerton says that Angelo Poliziano was the first writer who adduced medals as authorities for antient orthography and customs. He refers in his 'Miscellanea,' written about the year 1490, to some coins in the Medici collection.

The earliest examples of modern medals and medallions seem to be of the fifteenth century, though there is one remarkable exception to this in a medal of David II., king of Scotland. It is of gold, and was probably executed during that prince's captivity in England some time between the years 1330 and 1370. From the fifteenth century there is a succession of medals in most European countries. A

gold medal of the council of Florence, dated 1439, is one of the earliest. A still earlier one, if the date 1415 is correct, is of John Huss; but some doubts have been entertained of its authenticity. Vittore Pisano, a painter of Verona, is celebrated as the restorer of the art at that period; but the medal alluded to of David of Scotland seems to prove it was practised before his time. Pisano's medals are very large and are all cast. They are usually inscribed 'Opus Pisani Pictoris.' It is curious that he should always refer to his being a painter while exercising a totally distinct branch of art.

The Papal medals are among the finest of a continued series. They commence properly with Paul II., who began to reign in 1464; those of pontiffs who lived prior to that date having been added to the collection by successors. Some of the medals of a later period are valuable examples of the art, in which great improvements took place under Alexander VI. His successors Julius II., Leo X., and Clement VII., had many of their medals designed by Raffaello and Giulio Romano, while Benvenuto Cellini and other distinguished artists were employed to engrave them. A German family, named Ermerani, or Hermerani, of eminence as medal engravers, settled in Italy about the middle of the seventeenth century, and executed many of the Papal medals. This talent was not, it appears, confined to the men of this family: Venuti says each of the daughters also produced a fine medal.

The German medals commence in 1453, and are very numerous. The Sicilian medals appear as early as 1501. The first modern satirical medal is of that time, and was published by Frederick II. against his adversary Ferdinand king of Spain. It bears on one side the head of Ferdinand, with the inscription FERDINANDVS R. AR. VETUS VULPES ORBIS; on the reverse a wolf carrying off a sheep, with JUGUM MEUM SUAVE EST ET ONUS MEUM LEVE. Many others might be mentioned of this description. The employment of medals for the conveyance of satire is not confined to the moderns. Examples of it occur among the Romans, but they are rare.

The Spanish medals begin in 1503. The earliest of Venice appear in 1509; and those of Denmark in 1516. The first Dutch medals seem to be of 1566, and they are remarkable for the elaborate views, maps, and plans that are engraved on many of them. It has been observed among the distinctions of antient and modern medals, that in the former, when buildings are represented, the simple elevations only are given, while in the latter perspective views are exhibited. The Dutch indulged very freely in the satirical vein, and for which they eventually paid very dearly, as it contributed, in no small degree, to bring on them the whole hostile power of France under Louis XIV., who is said to have been highly exasperated at the publication of a medal in which Van Heubingen, the Dutch ambassador, was represented as Joshua (his name) arresting the progress of the sun, under which type the flatterers of Louis designated that monarch.

The French medals do not exhibit any remarkable excellence till this reign. The popularity of Louis XIV. gave an impulse to the art, and we find his entire life illustrated (with more respect however to the national glory and the prince's vanity than to historical truth) by medals; some of them are well designed and finely executed. The medallic history of Napoleon deserves notice in the series of medals of France. It is of great extent, and is, for the most part, honourable to French art.

The series of English coins and medals is one of the most perfect. The first medal is of 1480. It is of a large size, and is executed in the early Italian manner. On one side is a portrait with IO. KENDAL. RHODI. TURCUPELLARIUS; on the reverse the arms of Kendal, with the inscription, TEMPORE OBSIDIONIS TURCORUM. MCCCCLXXX. It was found in Knaresborough forest, but it is believed to be of foreign, probably Italian, workmanship. The next English medal is of the time of Henry VIII. It is of gold, and bears the king's portrait on one side, with an inscription on the reverse. The first coronation medal appears in the reign of Edward VI. The medals of Queen Mary are numerous, and very interesting from the devices they bear. The Scotch coronation medal of Charles I. is of gold, and was struck at Edinburgh. It is remarkable as being the first struck in Britain with a legend on the edge. Specimens of this medal in gold are very scarce. The medals of the Commonwealth and of Charles II. are by Simon. Those of Queen Anne are interesting from their being charged with the achievements of the great duke of Marlborough. Soon after this a Genevese artist, of the name of Dassier, was employed upon the medals of the kings of England, and executed many portraits of royal and other illustrious characters.

The study of medals is, in its class, of great importance. It is indispensable to the historian and the antiquary, and hardly less valuable to the man of taste. To the former, medals often afford information that cannot be obtained by other means, in the inscriptions, legends, and allegories with which they are charged; while to the artist and connoisseur many of them offer not only exceedingly beautiful examples of art, but, if their authenticity can be depended on, a series of medals of any nation is one of the best authorities that can be consulted for the state of the arts of design of any particular period.

It would be an almost endless task to enumerate the works that have been written on medals. The earliest treatise on the subject is that of Eneas Vico. It is dated 1548. The publications of Pinkerton in two volumes, of Eckhel, an introduction to the study of medals by Millin, of Barthélemy, Mionnet, and others, may be consulted for general information; while, for a more extended acquaintance with the subject, reference must be made to the voluminous illustrations which have emanated from those who have described in detail the various celebrated public and private collections. Some remarks on the manner of engraving dies for medals and coins will be found in the article on Intaglio. [INTAGLIO.]

MEDALLION, a medal of an extraordinary size. Medallions were never used as current coin: whereas it is probable that medals were *sometimes* allowed to pass in circulation as money.

MEDALLION, in architecture, any circular or oval tablet bearing on it objects represented in relief, as figures, heads, animals, flowers, &c.

MEDE, JOSEPH, was born at Berden in Essex, in the year 1586. When only ten years old he lost his father, but his education was well provided for by his relations. While a boy at school he met accidentally with a copy of Bellarmine's Hebrew grammar, and soon gained a considerable acquaintance with that language. In 1602 he entered Christ's College, Cambridge, and took his degree of master of arts in 1610. At this time his learning is spoken of as extraordinary. During the earlier part of his residence at college he is said to have been troubled with sceptical opinions, which however he soon shook off. His first work was a treatise, 'De Sanctitate Relativa,' addressed to Dr. Andrews, bishop of Ely, which procured for him the patronage of that prelate, who requested him to become his domestic chaplain. This offer Mr. Mede declined, and was soon after made a fellow of his college and reader of the Greek lecture of Sir Walter Mildmay's foundation. He appears to have been remarkably skilful and successful as a tutor.

In 1618 he took his degree of B.D. He refused the provostship of Trinity College, Dublin, which was twice offered him, in 1627 and 1630, through the influence of archbishop Usher. The extent of his ambition seems to have been to pursue his studies without interruption in the retirement of his college. There he spent the remainder of his life, and died in 1638, in his fifty-second year.

Mr. Mede was distinguished for his meekness, modesty, and prudence, and his liberality was such that he devoted the tenth of his scanty income to charitable uses. His learning was diversified and profound. In his younger years he studied astrology, but afterwards abandoned the pursuit. He was well acquainted with mathematics, medicine, and the various branches of philosophy, and was deeply versed in history and antiquities, and in the literature and sciences of the East, into the abstrusest parts of which he searched for illustrations of the prophecies of Scripture.

His chief work is the 'Clavis Apocalyptica,' containing a system for explaining the Apocalypse, which has been followed more or less by nearly all subsequent writers on the prophecies, and is recommended by bishop Hurd in his tenth sermon on the study of the prophecies, as being the first rational attempt to explain the Apocalypse. This work has been translated by Mr. T. Bransby Cooper, 8vo., Lond., 1833.

Mede's whole works were collected after his death by Dr. Worthington, in one vol. fol., Lond., 1672, with a life of the

author prefixed. There is also a recent edition of his 'Apostacy of the Latter Times,' 12mo., Lond., 1836.

MEDE'A. (Zoology.) [CILIOGRADA, vol. vii., p. 165.]

ME'DIA (Μηδία, מָדַי), a country of antient Asia. It is difficult to determine its boundaries, as they differed at various times. In the time of Strabo it was divided into two divisions, Great Media and Media Atropatene. Great Media, which is a high table-land, is said by all antient writers to have had a good climate and a fertile soil; an account which is fully confirmed by modern travellers. It was separated on the west and south-west from the low country, watered by the Tigris and Euphrates, by a range of mountains known to the antients under the name of Zagros and Parachoatras. Xenophon however appears to include in Media all the country between the Tigris and Zagros. (*Anab.*, ii. 4, § 27.) On the east it was bounded by a desert and the Caspian mountains (the modern Elburz mountains); and on the north and north-west by the Cadusii, Atropatene, and the Matieni, thus answering for the most part to the modern Irak Ajemi. Atropatene, which corresponds to the modern Azerbijan, extended as far north as the Araxes (Aras); it was much less fertile than Great Media, and does not appear to have been included in the Media of Herodotus. It derived its name from Atropates, who successfully opposed the Macedonians, and established an independent monarchy, which continued till the time of Strabo (p. 522, 523, Casaubon), notwithstanding its proximity to the Armenian and Parthian dominions.

The principal town of Great Media was Agbatana, or Ecbatana (Hamadan), the summer residence of the Persian kings. [ECBATANA.] South-west of Ecbatana was Baptana, or Bagistana [BESITTOON], situated on the great commercial road which, beginning at Ctesiphon, passed through the Median gates of the mountain-range called Zagros, and terminated at Ecbatana. This commercial road, which is determined by the physical character of the country, has continued in use to the present day. In the north-east of Great Media, near the Caspian gates, was the town of Rhagæ, afterwards called Europus by the Macedonians, and Arsacia by the Parthians, which was founded, or rather colonized, by the Macedonians under Seleucus Nicator. (Strabo, p. 524.) This town, of which the ruins are still visible at Rai, is frequently mentioned in the apocryphal book of Tobit, as the place where many of the Jews resided, who had been carried away captive by Shalmaneser. There are several passes through the Elburz mountains, to the south-east of Tehran, in the neighbourhood of Rai. Near Rhagæ was the Nisæan plain, celebrated for its breed of horses, which were considered in antient times the best in Asia. Arrian informs us that there were 50,000 horses reared in this plain in the time of Alexander, and that there were formerly as many as 150,000. (Herodot., iii. 106, vii. 40; Arrian, vii. 13; Strabo, p. 525; Ammian., xxiii. 6.)

The mountainous country in the south-western part of Great Media was inhabited by several warlike tribes, who maintained their independence against the Persian monarchy. Strabo mentions four tribes in particular (p. 524): the Mardi, bordering on the north-west of Persis; the Uxii and Elymæi, east of Susiana; and the Cossæi, south of Great Media. The king of Persia was obliged to pass through the country of the latter whenever he visited Ecbatana, and could only obtain a free passage by the payment of a considerable sum of money. The Cossæi were defeated by Alexander, but they never appear to have been completely subdued by the Macedonians.

The chief town of Atropatene was Gaza, or Gazika, as it is called by Ptolemy, at no great distance from the modern Tauris, or Taubreez. North-west of Gaza was a salt lake, called Spauta, or Martianus (Shahee, or Ourmia). In the north-east of Atropatene, near the Caspian Sea, there were many nomad tribes, which appear to have formed no part of the Median nation. The most powerful of these tribes were the Kadusii, or Gelæ, whence the modern name of that part of the country (Ghilan) is probably derived.

According to Herodotus the Medes were originally divided into six tribes, the Busæ, Paratæceni, Struchates, Arizanti, Budii, and Magi (i. 101). They were originally called Arii (Herodot., vii. 62); which word appears to contain the same root as Ar-tæi, the antient name of the Persians (Herodot., vii. 61). It is not improbable that this name was originally applied to most of the Indo-Germanic nations. Tacitus speaks of the Arii as one of the most powerful of the German tribes (*Germ.*, 43); and India proper is called, in the most antient Sanskrit works, Arrya-varta, 'holy land.' The same name was retained in the province of Ariana, and is still employed in the East as the proper name of Persia (Iran).

Media originally formed part of the Assyrian empire, but its history as an independent kingdom is given so differently by Herodotus and Ctesias (whose account is preserved in Diodorus), as to render it probable that the narrative of Ctesias must refer to a different dynasty in eastern Asia. Ctesias makes the Median monarchy last 282 years; and as Media was conquered by Cyrus about B.C. 560, it follows that the Median monarchy would commence, according to his account, about B.C. 842. Herodotus, on the contrary, assigns to the Median monarchy a period of 128 years, which, including the 28 years during which the Scythians had possession of the country, would place the commencement of the Median monarchy B.C. 716. The founder of the Median monarchy was Arbaces, according to Ctesias, who reckons eight kings from him to Astyages.

According to the account of Herodotus there were four kings of Media: 1, Deioces, who reigned B.C. 710-657. 2, Phraortes, B.C. 657-635, greatly extended the Median empire, subdued the Persians, and many other nations, but fell in an expedition against the Assyrians of Ninus (Nineveh). 3, Cyaxares, B.C. 635-595, completely organised the military force of the empire, and extended its boundaries as far west as the Halys. In an expedition against Nineveh, he was defeated by the Scythians, who had made an irruption into southern Asia, and was deprived of his kingdom for 28 years. After the expulsion of the Scythians, he took Nineveh, and subdued the Assyrian empire, with the exception of the Babylonian district (Βαβυλωνίης μοίρης). 4, Astyages, B.C. 595-560, who was dethroned by his grandson Cyrus, and Media reduced to a Persian province. The history of the rise of the Persian monarchy is related very differently by Xenophon, who also makes a fifth Median king, Cyaxares II., succeed Astyages.

The Medes revolted during the reign of Darius II., the father of the younger Cyrus, about B.C. 408, but were again subdued. (Herodot., i. 130; Xenoph., *Hellen.*, i. 2, § 19.) They do not appear after this time to have made any further attempt at recovering their independence. On the downfal of the Persian empire they formed a part of the kingdom of the Seleucidæ, and were subsequently subject to the Parthians.

ME'DICI, FAMILY OF. The early history of the family of the Medici is obscure, although some authors have traced their genealogy from the age of Charlemagne. But it must be remembered that these genealogies were made after the elevation of this family to supreme power in Florence. It appears however, from authentic monuments, that many individuals of this family had signalised themselves on various important occasions. Giovanni de' Medici, in the year 1251, with a body of only one hundred Florentines, forced his way through the Milanese army, then besieging the fortress of Scarparia, and entered the place with the loss of twenty lives. Francesco de' Medici was at the head of the magistracy of Florence in 1348, at the time when the black plague, which had desolated so large a portion of the world, extended its ravages to that city. Salvestro de' Medici acquired great reputation by his temperate but firm resistance to the nobles, who, in order to secure their power, accused those who opposed them of being attached to the party of the Ghibelines, then in great odium at Florence. The persons so accused were said to be *ammoniti* (admonished), and by that act were excluded from all offices of government. In the year 1379, Salvestro, being chosen chief magistrate, exerted his power to reform this abuse, which was not however effected without a violent commotion, in which several of the nobility lost their lives. After the death of Salvestro, his son, Veri de' Medici, continued to hold a high rank in the republic, and was in great favour with the populace.

The founder however of that greatness which his posterity enjoyed for several ages was Giovanni de' Medici, the great-grandfather of Lorenzo the Magnificent. By a strict attention to commerce, he acquired great wealth; by his affability, moderation, and liberality, he ensured the confidence and esteem of his fellow-citizens. Without seeking after the honours of the republic, he was honoured with them all. The policy by which the house of Medici attained

its political power is indicated in the charge given by this venerable old man on his death-bed to his two sons, Cosmo and Lorenzo: 'I feel,' said he, 'that I have lived the time prescribed me. I die content; leaving you, my sons, in affluence and in health, and in such a station, that whilst you follow my example, you may live in your native place honoured and respected. Nothing affords me more pleasure than the reflection that my conduct has not given offence to any one; but that, on the contrary, I have endeavoured to serve all persons to the best of my abilities. I advise you to do the same. With respect to the honours of the state, if you would live with security, accept only such as are bestowed on you by the laws and the favour of your fellow-citizens; for it is the exercise of that power which is obtained by violence, and not of that which is voluntarily given, that occasions hatred and contention.' He died in the year 1428, leaving two sons, Cosmo, born in the year 1389, and Lorenzo in 1394, from the latter of whom is derived the collateral branch of the family, which in the beginning of the sixteenth century obtained the absolute sovereignty of Tuscany.

Even in the life-time of his father, Cosmo had engaged not only in the extensive business by which the family had acquired its wealth, but also in the affairs of state. Such was his authority and reputation, that in the year 1414, when Balthasar Cossa, who had been elected pope, and had assumed the name of John XXIII., was summoned to attend the council of Constance, he chose to be accompanied by Cosmo de' Medici, among other men of eminence, whose characters might countenance his cause. By this council, which continued nearly four years, Balthasar was deprived of his pontifical dignity, and Otto Colonna, who took the name of Martin V., was elected pope. Cosmo did not desert in adversity the man to whom he had attached himself in prosperity. At the expense of a large sum of money, he redeemed him from the hands of the duke of Bavaria, who had seized upon his person; and afterwards gave him an hospitable shelter at Florence during the remainder of his life. The successful pontiff, instead of resenting the kindness shown to his rival, soon afterwards paid a public visit to Florence, where, on the formal submission of Balthasar, and at the request of the Medici, he created him a cardinal, with the privilege of taking the first place in the sacred college. The new-made cardinal died in 1419, and it was rumoured that the Medici at his death possessed themselves of immense wealth which he had acquired during his pontificate. This rumour was afterwards encouraged by those who well knew its falsehood. The true source of the wealth of the Medici was their superior talents and application to business, and the property of the cardinal was scarcely sufficient to discharge his debts and legacies.

The authority which Cosmo and his descendants exercised in Florence, during the fifteenth century, consisted rather in influence than in any definite power. Cosmo exerted this influence with great prudence, yet owing to the discontent of the Florentines with the result of the war against Lucca, a party arose, headed by Rinaldo de Albizi, which, in 1433, after filling the magistracies with their own adherents, seized Cosmo, and committed him to prison. He was afterwards banished to Padua for ten years, and several other members and friends of the Medici family were treated in the same way. From Florence Cosmo proceeded immediately towards Venice, where he was received with marked respect by the government; and after a short stay there he went to Padua. Upon an application to the Florentine state by Andrea Donato, the Venetian ambassador, it was consented to that he might reside on any part of the Venetian territories, but not to approach within one hundred and seventy miles from Florence. The affectionate reception which he had met with at Venice induced him to fix his abode there. Within a year of Cosmo's retreat, Rinaldo was obliged to quit Florence; and Cosmo was recalled, and returned amidst the acclamations of the people. The gonfaloniere, or standard-bearer, the executive officer who had pronounced his sentence, with a few others of his party, were put to death on the occasion. Measures were now taken to restrict the choice of magistrates to the partisans of the Medici, and alliances were formed with the neighbouring powers for the purpose of supporting and perpetuating the new system of administration in Florence. The subsequent life of Cosmo de' Medici was an almost uninterrupted course of prosperity. The tranquillity enjoyed by the republic, and the satisfaction which he experienced in the esteem and confidence of his fellow-citizens, enabled him to indulge his taste for the promotion of science and the encouragement of learned men. Though a private citizen, he surpassed almost all the princes of Europe in his munificent patronage of literature and the fine arts. He assembled round him some of the most learned men of the age, who had begun to cultivate the Greek language and philosophy. He established at Florence an academy expressly for the explanation of the Platonic philosophy, at the head of which he placed the celebrated Marsilius Ficinus. By means of foreign correspondence, he collected the Greek, Latin, and Oriental MSS., which formed the basis of the Laurentian library; nor was he less liberal in his encouragement of the fine arts. During the retirement of his latter days, his happiest hours were devoted to the study of letters and philosophy, and the conversation of learned men. He also endowed numerous religious houses, and built an hospital at Jerusalem for the relief of distressed pilgrims. The spirit of his administration was moderate, he avoided all appearance of state which might excite the jealousy of the Florentines; and, by way of increasing his interest among them, he confined the marriages of his children to Florentine families. By this prudent conduct and his benevolence, he acquired the title of 'father of his country,' which was inscribed upon his tomb; an appellation which, as it was founded on real merit, has ever since been attached to the name of Cosmo de' Medici. He died August 1st, 1464. Cosmo de' Medici married Contesina Bardi, of a noble and illustrious family, which had been long distinguished at Florence. By her he had two sons, Giovanni and Piero; and he had a natural son by a mistress.

Giovanni de' Medici was one of the Florentine ambassadors who were sent, in 1455, to take the necessary oaths to Calixtus III., who had succeeded Nicholas V. He was Cosmo's favourite son, on whom all his future hopes and expectations rested; but he died prematurely in 1463. Giovanni married Cornelia de Alessandri, by whom he had only one son, who died an infant. Piero de' Medici succeeded to Cosmo's fortune and authority at Florence: Cosmo, in the decline of life, had recommended to his surviving son to employ one Diotisalvi Neroni as his minister, whom he believed to be attached to the Medici interests; but the ambition of Neroni, and the disaffection of some former friends of the Medici, had nearly proved fatal to Piero's administration. It was the intention of the conspirators to surprise Piero at one of his country residences; but one of the conspirators went and communicated the plot to him. Piero, by an expeditious return to the city, at the head of a chosen troop of his friends, baffled the designs of his enemies. Most of the conspirators saved themselves by flight: and though, with the assistance of the Venetians, they afterwards made a stand, they were finally compelled to evacuate Tuscany. Piero died Dec. 3, 1469, leaving by his wife, Lucretia Tornabuoni, two sons and two daughters, Lorenzo, Giuliano, Bianca, and Giovanna.

At the death of Piero de' Medici, his two sons inherited his property; but Lorenzo succeeded him as head of the republic, and upon him the title of Magnificent was afterwards conferred. From the time of Cosmo's death, in 1464, on account of the infirmities of his father, Lorenzo had been introduced to a knowledge of public affairs, although then only in his sixteenth year. With this view he was sent to visit the principal courts in Italy. Upon the accession of Sixtus IV. to the papal throne, he went, with other citizens of Florence, to congratulate the new pope, and was invested with the office of treasurer of the holy see; and while at Rome took every opportunity to add to the remains of antient art which his family had collected. One of the first events after he undertook the administration of affairs was a revolt of the inhabitants of Volterra, on account of a dispute with the Florentine republic. By the recommendation of Lorenzo, force was used, and the result was the sack of Volterra. In 1472 he re-established the academy of Pisa, to which city he removed in order to complete the undertaking: he selected the most eminent professors, and contributed a large sum from his private fortune, in addition to that granted by the state of Florence. Lorenzo, who was, or affected to be, an admirer of Plato, took an active part in the establishment of an academy for the cultivation of the Platonic philosophy, and instituted an annual festival in honour of Plato. Whilst Lorenzo was thus dividing his time between the administration of the state and the promotion of literature, the Pazzi,

a numerous and distinguished family in Florence, formed a conspiracy to assassinate Lorenzo and his brother. Giuliano was killed, but Lorenzo escaped. The people, who were attached to the Medici, collecting in great numbers, put to death or apprehended the assassins. Salviati, archbishop of Pisa, was hung through the windows of the palace, and was not allowed to divest himself even of his robes; and Jacopo de' Pazzi, with one of his nephews, shared the same fate. The name and arms of the Pazzi family were suppressed, its members were banished, and Lorenzo rose still higher in the esteem and affection of his fellow citizens. Sixtus IV., who was a party to this conspiracy, excommunicated Lorenzo and the magistrates of Florence, laid an interdict upon the whole territory, and, forming a league with the king of Naples, prepared to invade the Florentine dominions. Lorenzo appealed to all the surrounding potentates, and he was zealously supported by his fellow-citizens. Hostilities were commenced, and carried on for two campaigns. At the close of 1479, Lorenzo took the bold resolution of paying a visit to the king of Naples, and, without obtaining any previous promise of security, trusted himself to the mercy of his enemy. The result of this confidence was a treaty of mutual defence and friendship between the king of Naples and Florence, and Sixtus afterwards consented to a peace. The death of Sixtus IV. freed Lorenzo from a dangerous enemy, and he found a friend in his successor Innocent VIII. Lorenzo now secured to the republic of Florence a degree of tranquillity and prosperity which it had scarcely ever known before; and by procuring the institution of a deliberative body, of the nature of a senate, he corrected the democratical part of its constitution.

Lorenzo distinguished himself above all his predecessors by the encouragement of literature and the arts. His own productions are sonnets, canzoni, and other lyric pieces; some longer works in stanzas, some comic satires, carnival songs, and various sacred poems. Many of the lighter kind were popular in their day. Although the ancestors of Lorenzo laid the foundation of the immense collection of manuscripts contained in the Laurentian library. Lorenzo has the credit of adding most largely to the stock. For the purpose of enriching his collection of books and antiquities, he employed learned men in different parts of Italy, and especially his intimate friend Politian, who made several journeys in order to discover and purchase the valuable remains of antiquity. Two journeys were undertaken at the request of Lorenzo into the East by John Lascaris, and the result was the acquisition of a great number of manuscripts. On his return from his second expedition, Lascaris brought two hundred MSS., many of which he had procured from a monastery at Mount Athos; but this treasure did not arrive till after the death of Lorenzo, who in his last moments expressed to Politian and Pico of Mirandola his regret that he could not live to complete the collection which he was forming. On the discovery of the art of printing, Lorenzo quickly saw and appreciated its importance. At his suggestion, several Italian scholars devoted their attention to collating the manuscripts of the antient authors, for the purpose of having them accurately printed. On the capture of Constantinople by the Turks, many learned Greeks took refuge in Italy; and an academy was established at Florence for the purpose of cultivating the Greek language, partly under the direction of native Greeks, and partly under native Italians. The services of these learned men were procured by Lorenzo, and were amply rewarded by his bounty. 'Hence,' as Roscoe observes, 'succeeding scholars have been profuse of their acknowledgements to their great patron, who first formed that establishment, from which (to use their own scholastic figure), as from the Trojan horse, so many illustrious champions have sprung, and by means of which the knowledge of the Greek tongue was extended, not only through Italy, but through France, Spain, Germany, and England, from all which countries numerous pupils attended at Florence, who diffused the learning they had there acquired throughout the rest of Europe.'

Lorenzo also augmented his father's collection of the remains of antient art. He appropriated his gardens in Florence to the purpose of an academy for the study of the antique, which he furnished with statues, busts, and other works of art, the best in their kind that he could procure. The higher class of his fellow-citizens were incited to these pursuits by the example of Lorenzo; and the lower class by his liberality. To the latter he not only allowed competent stipends while they attended to their studies, but gave considerable premiums as rewards of their proficiency. To this institution, more than to any other circumstance, Roscoe ascribes the sudden and astonishing advance which, toward the close of the fifteenth century, was evidently made in the arts, and which, commencing at Florence, extended itself to the rest of Europe. In 1488 Lorenzo lost his wife; and on the 8th of April, 1492, he sunk under a slow fever, and expired in the forty-fourth year of his age. Leoni of Spoleto, his physician, a person of great eminence in his profession, is said to have hastened his death by mistaking his case.

By his wife, Clarice Orsini, Lorenzo had a numerous family: three sons (Piero, Giovanni, and Giuliano) and four daughters arrived at the age of maturity. Piero was born Feb. 15th, 1471, Giovanni in 1475, and Giuliano in 1478. Giovanni was afterward known under the name of Leo X.; and Giuliano, having allied himself by marriage to the royal house of France, became Duke of Nemours.

Of Giuliano, the brother of Lorenzo, Roscoe preserves an interesting anecdote. Shortly after the attempt at assassination, he says, 'Lorenzo received a visit from Antonio da San Gallo, who informed him that the untimely death of Giuliano had prevented his disclosing to Lorenzo a circumstance with which it was now become necessary that he should be acquainted: this was the birth of a son, whom a lady of the family of Gorini had borne to Giuliano about twelve months before his death, and whom Antonio had held over the baptismal font, where he received the name of Giulio. Lorenzo immediately repaired to the place of the infant's residence, and, taking him under his protection, delivered him to Antonio, with whom he remained until he had arrived at the seventh year of his age. This concealed offspring of illicit love, to whom the kindness of Lorenzo supplied the untimely loss of a father, was destined to act an important part in the affairs of Europe. The final extinction of the liberties of Florence, the alliance of the family of Medici with the royal house of France, the expulsion of Henry VIII. of England from the bosom of the Roman Church, and the consequent establishment of the doctrines of the reformers in this island, are principally to be referred to this illegitimate son of Giuliano de' Medici, who through various vicissitudes of fortune at length obtained the supreme direction of the Roman see, and under the name of Clement VII. guided the bark of St. Peter through a succession of the severest storms which it has ever experienced.'

Piero, the eldest son of Lorenzo, succeeded him in the administration of Florence. Politian said that his father had a favourable opinion of his capacity, but it soon appeared that he was unequal to the task of government. With the view of obtaining the sovereign power at Florence, he formed a more intimate connection with the pope and the king of Naples. On the entrance of the French into Italy under Charles VIII. he deserted his allies. As soon as the French king reached the confines of the Florentine state, Piero had a secret interview with him, in which he was lavish in his offers to promote the interest of the king, and as a pledge of his fidelity surrendered to him the important fortress of Sarzana, with the town of Pietra Santa, and the cities of Pisa and Leghorn. Charles undertook to restore these places as soon as he had accomplished the conquest of the kingdom of Naples. On his return to Florence after this disgraceful compromise, Piero was refused admittance into the palace of the magistrates, and, finding the people were so highly exasperated against him as to endanger his personal safety, he hastily withdrew himself from his native place to Venice. The miseries which the inhabitants of Italy experienced in consequence of the French invasion belong to the general history of Italy. The plundering of the palace of the Medici, and the dispersion of that invaluable library which had been collected by the care of the Medici, were among the misfortunes that befel Florence. The French troops, which had entered the city without opposition, led the way to this act of barbarism, in which they were joined by the Florentines themselves, who openly carried off or purloined whatever they could discover that was rare or valuable. Besides the numerous manuscripts, the plunderers carried off the inestimable specimens of the arts which the palace of the Medici contained, and which had long made it the admiration of strangers and the chief ornament of the city. Exquisite pieces of antient

sculpture, vases, cameos, and gems of various kinds, were lost amidst the indiscriminate plunder, and the rich accumulations of half a century were destroyed or dispersed in a single day.

The subsequent history of Piero was a continual succession of mortifications and disappointments. In 1504, when Italy was invaded by Louis XII., Piero entered into the service of the French, and was present at the engagement in which they were defeated by the Spaniards with great loss, upon the banks of the Garigliano. In effecting his escape he attempted to pass the river; but the boat in which he, with several other men of rank, had embarked, being laden with heavy cannon, sunk in the stream.

Of the subsequent restoration of the Medici to Florence, an account is given in the life of LEO X., as well as, under COSMO I., of the assassination of Alessandro, and the final extinction of the republic, when Cosmo was elevated to the rank of duke of Florence, and afterwards to that of grand-duke of Tuscany. For more minute details of the house of Medici, the several works may be consulted from which this notice has been chiefly derived.

(*Modern Universal History*, 8vo., vol. xxxvi.; Noble's *Memoirs of the House of Medici*, illustrated with genealogical tables; Tenhove's *Memoirs of the House of Medici*, translated from the French by Sir R. Clayton, 2 vols. 4to., Bath, 1797; Roscoe's *Life of Lorenzo de' Medici*, 2 vols. 4to., Lond., 1796; and his *Life and Pontificate of Leo X.*, 4 vols. 4to., Liverp., 1805.)

The genealogy of the Medici to the present time is given in a splendid work but little known, entitled 'Famiglie celebri Italiane,' di P. Litta, still in progress. The Medici and their descendants are comprised in 'Fascicolo XVII.,' in seven parts, folio, Milan, 1827-30.

MEDICINE. The earliest records of the practice of medicine are extremely obscure. Among the Jews it appears to have been entirely confined to the priests, and the whole art seems to have consisted in the prevention of contagion by isolation and cleanliness, and the administration of a few uncertain remedies. The Egyptians, according to the account of Herodotus, must have made some little progress; purging medicines and emetics were well known to them and much used; and such was the subdivision of labour, that there were physicians for every separate complaint, some for the eyes, others for the head, others for the teeth, others for the abdominal parts, and others for diseases which did not manifest themselves by outward visible symptoms. (Herod., ii. 84.) It appears however that in the time of Darius the son of Hystaspes, the Greeks possessed at least more skill than the Egyptians. (Herod., iii. 129.) The Greeks probably derived their knowledge of medicine, with that of many other arts, from Egypt, whence Chiron, the Centaur of their fables, is said to have first introduced it among them. His pupil Æsculapius [ÆSCULAPIUS] so much improved the art, that he was deified; and Machaon and Podalirius, his sons, accompanied the Grecian army to the siege of Troy. From circumstances mentioned in the 'Iliad,' it would appear that their practice was almost entirely confined to the treatment of wounds, and that charms and incantations formed a considerable portion of the means which they employed. The descendants of Æsculapius were for many years the chief practitioners of medicine: they were called Asclepiadæ, and were the priests of the temples erected in honour of their progenitor, to which the sick were accustomed to resort for advice and the application of remedies.

In the sixth century before the Christian æra, medicine, with other sciences, began to be more philosophically studied in Greece, and among the first of those who devoted much of their time to the investigation of the structure and functions of the animal body was Pythagoras. His pupils Democritus and Heraclitus appear also to have added considerably to the knowledge both of anatomy and of practical medicine, and their contemporary Herodicus first introduced the practice of gymnastic exercises, which afterwards formed so large a part of medical treatment. [GYMNASTICS.] But the most remarkable man in the history of medicine in Greece was Hippocrates, one of the Asclepiadæ, who was born at Cos (where one of the chief temples was erected), B.C. 460, and was the pupil of Heraclitus and Herodicus. [HIPPOCRATES.] The improvements which he made in medicine (and many of which are detailed in the article referred to) were so considerable, that for many centuries his successors appear to have been content to follow him in reverential imitation. His sons Thessalus and Draco, and his son-in-law Polybius, were the most renowned of his descendants, and they are generally regarded as the founders of the medical sect or school which was called the Hippocratean or Dogmatic sect.

The establishment of the Alexandrian school of philosophy forms the next most important epoch. The science of medicine was assiduously cultivated, and the human body was first dissected in Alexandria by Erasistratus and Herophilus. [HEROPHILUS.] The former was the pupil of Chrysippus, a violent opponent of the Hippocratic school, and a bold innovator in medicine, with whom probably originated the schism in consequence of which, for some centuries, every physician ranged himself in one of two sects, the Dogmatists and the Empirics. The Dogmatists held that disease could not be securely treated, except on the foundation of a knowledge of the healthy structure and actions of the body, and of the influence of remedies, and the effects of disease upon it; while the Empirics maintained that such knowledge was not only unnecessary, but unattainable, and that simple experience should be the only guide to practice. The progress of the science was greatly arrested by the observation of facts being neglected in the ardour with which each party argued its own cause, and the dispute only seemed to cease with the introduction of a new sect.

During the early periods of the Roman empire medicine seems to have been little cultivated, and, according to Pliny (xxix. 1), Rome was for 600 years without professed physicians, though not entirely without medical knowledge. The first individual of any eminence who practised medicine in Rome was Asclepiades of Bithynia [ASCLEPIADES], who lived in the century before the commencement of the Christian æra; but he does not appear to have advanced the knowledge of the science. He was succeeded by his pupil Themison, the founder of a sect called Methodics, who held doctrines nearly intermediate between those of the Dogmatists and of the Empirics. A large majority of succeeding physicians attached themselves to this sect, and among them were Soranus and Aurelianus, whose writings are the principal that remain of this period.

About two centuries later the Methodics were divided into numerous sects, as the doctrines of particular physicians became more generally received. The chief of these sects were the Pneumatics and the Eclectics. The former are represented by their most eminent writer, Aretæus [ARETÆUS], who lived in the reign of Vespasian, and the chief points of their doctrines are detailed in his life. Of the Eclectics, the most celebrated was Archigenes, of Apamea, who practised at Rome in the time of Trajan. But the most remarkable writer of this age was Celsus, in whose work, 'De Medicinâ,' the progress and condition of medicine previously to and during his life are amply detailed. [CELSUS.] He was the first native of Rome who is known to have studied medicine, and the only one who did so with success. In his time medicine, which, as a science, might be said to have had its origin with Hippocrates, had made considerable progress; the several sects of its professors differed rather in their pretensions than in any important point of knowledge; the philosophical learning, which some sought and others despised, was almost entirely hypothetical, and had relation only to the doctrines of the mutual actions of imaginary atoms, elements, and spirits, but all had been alike engaged in the study of practical medicine, and their accumulated experience had by this time formed a very considerable amount of useful knowledge.

The individual whose history forms the next chief epoch in the history of medicine is Galen; but it will be unnecessary to repeat what has already been said of his doctrines and practice. [GALEN.] For a long time after his death physicians were chiefly occupied in commenting on his works, and imitating, as closely as they could, his practice. His writings were regarded as ultimate authority, and everything that seemed opposed to them was at once rejected. From the time of Galen to the seventh century the only names of any repute (and theirs is but small) are Sextus Empiricus, Oribasius, Ætius, Alexander Trallianus, and Paulus of Ægina; and after the death of the last of these, no medical work of the least merit was published in the Greek language.

From the seventh to the twelfth century the only nation in which medicine made any progress, or was even prevented from retrograding, was the Arabian. It appears that in

the conquest of Alexandria some books were saved from the burning of its magnificent library, and that among them were the writings of Hippocrates and Galen. The latter were soon translated into Arabic and diligently studied; and all the earliest Arabian works on medicine, as those of Ahrun in the eighth, and Serapion in the ninth century, are little more than transcripts of those of Galen. One of the most illustrious of the Arabian school was Rhazes, who was born in the ninth century, and whose works contain many original observations, of which the most remarkable relate to some important diseases, unknown to, or at least not described by former writers, as smallpox and measles. In those parts of his writings which relate to pharmacy Rhazes describes some of the earliest of what are called chemical remedies, which were doubtless suggested by the recent origin of the systematic practice of chemistry among his countrymen. After Rhazes was Ali-Abbas, and after him Avicenna, who attained the highest repute of all. He was born in 980, and has left voluminous writings, which however appear to show that his fame is deserved only when he is placed in comparison with his contemporaries. Neither Avicenna nor the later writers, Mesue and Albucasis, contributed anything of importance to the progress of medicine. Avenzoar and Averroes were disciples of the Arabian school, and, though natives of Spain, wrote in the Arabic language. The former was the preceptor of the latter, and lived in the eleventh century, and his works are among the few that exhibit even slight departures from the doctrines of Galen. The circumstances which chiefly mark the period of the Arabian school of medicine are, the more correct description of several diseases, the first records of some new and important ones, and the introduction of several valuable remedies, both from the vegetable productions of the tropical and oriental countries, and from the chemical processes which were then first brought into general use. But the physicians adhered too carefully to the doctrines of Galen to make much progress in their science; and anatomy, physiology, and pathology appear to have been almost entirely neglected.

From the decline of the Arabian school in the twelfth century to the beginning of the fifteenth, the history of medicine presents few circumstances of interest. The dissection of the human body was first publicly practised by Mondini at Bologna, about the year 1315; and at about the same time lived Gilbert, the first English writer on medicine who acquired any repute. Between the twelfth and fifteenth centuries several of the most important universities were founded, with a school of medicine attached to each: that of Salerno was established in the twelfth century, that of Montpelier in the thirteenth, those of Bologna, Vienna, and Paris in the fourteenth, and in the fifteenth those of Rome, Padua, Pavia, and several other cities in Italy. By means of these, and by the impetus which, with all other sciences, it received from the invention of printing, medicine again commenced a forward course. In this country it derived the greatest advantages from Linacre [LINACRE] and the establishment of the college of physicians, to whose members, in succeeding years, several of the most brilliant discoveries are due.

In the fifteenth century the sect of chemical physicians arose, and their doctrines, under the bold advocacy of Paracelsus, who publicly burnt the writings of Galen, obtained considerable credit and numerous supporters. Their main assertion was that the operations of the living body are entirely governed by the same chemical laws as obtain in inorganic matter; and the works of all the writers of the fifteenth century are filled with arguments in support either of this doctrine or of the more antient tenets of Galen. The Galenists were of course the more learned party, who were well versed in the antient books; while the chemists were chiefly those who were more practically skilled in the arts of that newly discovered science. Neither party can be said to have much advanced the knowledge of medicine; but in the middle of the sixteenth century the most important improvement commenced in the diligent and accurate study of anatomy by Vesalius [VESALIUS], who, disregarding the general obloquy which he incurred, carefully studied the structure of the most important parts of the human body.

From the time of Vesalius, the study of anatomy was diligently pursued, and in the early part of the seventeenth century was rewarded by several of the most interesting and important discoveries; as that of the circulation by Harvey [HARVEY], of the absorbents by Asellius, of the process of respiration by Malpighi [MALPIGHI], and numerous others. Among the most celebrated men of the seventeenth century, may be enumerated Glisson, Bartholin, Rudbeck, Fabricius, Hooke, Sylvius, Willis, Riolanus, Fallopius, and Bellini. All of them were employed in the diligent pursuit of anatomical and physiological knowledge; and, somewhat later, Sydenham again introduced a truly Hippocratic mode of observation of the phenomena of disease in its symptoms, causes, and effects, and in the influence of remedies upon it. By the combined efforts of the anatomists and the practical physicians, medicine in this century made the most remarkable progress, although it was in some measure checked by the attempted application of the laws of mechanics (then, from the discoveries of Newton and others, the dominant science) to the explanation of all the phenomena of the living body. The iatro-mathematicians, as those who supported this theory were called, were long engaged with the chemists, who had already conquered the Galenists; and to these rival sects was then added that of the Vitalists, founded by Van Helmont [HELMONT, VAN], which at last obtained complete ascendancy over both. The Vitalists held that there is in the living body a principle (upon which different members of the sect conferred different hypothetical appellations) which presides over and directs all the processes of the living body, and is directly opposed to the influence of chemical and mechanical agents. Stahl, Hoffmann, and Boerhaave were of this school, though each considerably modified the opinions of its founder.

Among the pupils of Boerhaave were Van Swieten and Haller. The former adopted the hypothetical spirit of the school too closely to add much of real value to medical science; but the latter may be fairly considered to have done more for it than any other single individual. Before the time of Haller, the cases of Harvey, Glisson, Malpighi, and others, who devoted themselves to the simple observation of facts and the evident deductions from them, were exceptional; but since his time, the exceptions have rather been those who, with a comparative neglect of observation, have endeavoured only to find or support some theory by which all the phenomena they met with might seem explained. Haller's contemporary Cullen [CULLEN], though he yielded much more to theory, was of eminent service in the study of practical medicine; and his opponent Brown is acknowledged to have introduced many useful lessons in the same branch of the study.

With the gradual oblivion of the hypotheses of both Cullen and Brown, the theoretical study of medicine may be considered to have entirely ceased, and in the present day we may certainly be said to be without any general medical theory. From the time of Haller, medicine has acquired more and more nearly the character of a science of simple observation and the patient investigation of facts. Its history would therefore consist of little more than a recital of successive discoveries, each perhaps small when compared with the vast amount of knowledge still unexplored, yet altogether so numerous that even a sketch of them could not be here introduced. The reader must therefore be referred to the several articles on the different branches of medicine and its collateral sciences, and to the lives of those who have been most conspicuous for their discoveries.

MEDICK, a corruption of Medicago, is a name given to different plants belonging to the Papilionaceous division of the Leguminous order. Black medick is Medicago Lupulina; purple medick is M. sativa, or lucerne; yellow medick is M. falcata. They are all agricultural plants, and of considerable value, but lucerne is the only one generally cultivated. [LUCERNE.] Black medick, also called black nonsuch, is sometimes sown by farmers in dry gravelly soil as the commencement of a pasturage; unless sheep-fed, it lives only for a couple of years, but during that time it affords a crop, and when it dies off, the perennial grasses sown with it cover the land and take its place; but if closely fed by sheep or other animals, it becomes a true perennial, and forms a valuable part of the herbage. Its name is derived, not from the colour of the flowers, for they are yellow, but from that of the pods, which are curved, black, and clustered together at the ends of the branches. That it should be supposed to be the same as hop-trefoil would have scarcely been credible, did we not possess evidence of the fact in one of the best of our English works on agriculture; this latter plant resembles it in the leaves

and flowers; but the latter, when the pods are ripe, cover them over in such a way as to produce the appearance of a head of hop-flowers. Yellow medick is only grown in very poor soils in some parts of Europe; in England it is not an agricultural plant, but is found wild on the tops of old walls and on antient ruins, which it clothes with a green herbage, and thus evinces its fitness for the most sterile places, where there is room for its long roots to extend themselves. Tree medick (Medicago arborea) is a large bush in the south of Italy, and was doubtless the plant called Cytisus by the Romans.

MEDINA. [ARABIA.]

MEDITERRANEAN (or *Midland-Sea*), the name of the sea between the Straits of Gibraltar to the west and the Dardanelles and Syria to the east. This sea was antiently called The Sea, or the Great Sea, by the Jews. The Greeks do not seem to have had any general name for the Mediterranean: Herodotus calls it 'this sea' (i. 185); and Strabo calls it 'the sea within the columns,' that is, within the Straits of Gibraltar (121, 491, Casaub.). Mela calls the whole sea by the name 'our sea' (*nostrum mare*), and observes that different parts have their several names. Pliny appears to have no general name for it. The term Mediterranean is not applied to this sea by any classical Latin writer. It was called *bahr-roum*, or the sea of Rome, by the Arabs.

The Mediterranean is comprised between the parallels of 30° 15′ and 45° 50′, and the meridians of 5° 30′ W. and 36° 10′ E. The distance from Gibraltar to the farthest shore of Syria is 2000 miles, and the narrowest part, between Sicily and Africa, is 79 miles across. The Mediterranean, including the islands, occupies an area of 734,000 square miles. The surface of country of which it receives the drainage is very difficult to estimate, but may be assumed to exceed this quantity. On the shores of this sea have been transacted the most important events in the history of mankind, and its character seems to mark it as the theatre best adapted to the complete and rapid civilization of the race. From the great diversity of soil and productions, under a varied and favourable climate, the colonists, from whatever points they first proceeded, would soon acquire those different habits under which their several energies and capabilities would be developed. The comparative shortness of the distances of the several places, by rendering navigation easy and pleasant in small and imperfect vessels, would, by facilitating intercourse from an early period, tend to diffuse and to promote civilization; while commerce, by bringing together men of different habits, manners, and languages, and thus circulating practical information, would supply the materials for the perfection of the arts and sciences.

As a notice even of a cursory kind, of countries and cities whose history is connected with almost every history in the world, would greatly exceed our limits, we shall confine ourselves almost entirely to those points which concern our subject as a *sea*, referring the reader for all specific local information to the particular names. We shall therefore take a short view of the shores, beginning at Syria and proceeding along Asia Minor to Gibraltar, and return along the coasts of Africa to Egypt, noticing some remarkable historical points, the commerce, winds, currents, and the saltness of the water, and introducing slight references to the navigation, antient and modern, and the principal naval actions.

The shores of Syria, the general name of the country between Anatolia and Arabia, are mountainous between Tripoli and Tyre, but present in many places a large extent of low and flat coast. The climate is excessively hot in summer, and the winter often severe. The chief ports are Alexandretta, Beyrout, and Tripoli. The trade is carried on in small coasting vessels, but under the oppressive and ignorant government of the Turkish pashas it is very small. Tyre, and Sidon, afterwards still more famous, are reduced to fishing villages. Though the country was antiently inhabited above Mount Carmel by the Phœnicians, but few antient monuments have been found bearing inscriptions.

The coast of Anatolia, the west portion of Asia Minor, is mountainous, rising in some parts very near the sea to 7000 and 8000 feet. It is now a Turkish province. About 20 leagues from the nearest coast of Syria is the island of Cyprus, where the greatest number of Phœnician inscriptions have been found, though none of a date prior to three centuries before Christ. The island of Candia, the name given by the Venetians to the antient Crete, is highly fertile, productive, and beautiful, but has little trade. The city of Candia stands in the port of the same name; Suda is a fine port. The island of Rhodes, celebrated for the first code of maritime laws, for its schools in the time of the Romans, and in the wars of the Knights of Jerusalem against the Turks, is situated off the south-west corner of Asia Minor, and is now in the hands of the Turks. It produces wine, fruit, and pine-timber.

The numerous islands in the sea called the Ægean Sea, between Greece and Asia Minor, forming the Grecian Archipelago, are in general verdant and picturesque, and afford delightful sailing in summer, but they are subject to very heavy squalls. The sides of the islands being steep, and the water very deep, there are in general no anchorages but in particular places. Delos, celebrated for its temple and oracle, was long an emporium of commerce, and was at one time noted for its trade in slaves. It declined in the wars of Mithridates. Scio, a high and beautiful island, covered with the gardens of the Greek merchants, of whom it was the favourite resort, was devastated by the Turks in 1822. Milo is the residence of the pilots of the Archipelago. The Archipelago and its coasts contain many high mountains, as Athos, 6774 feet high, and many others. Smyrna, a place of high antiquity, is the great commercial entrepôt of this part of the world. The chief exports are silk, drugs, and fruits, for which ships carry manufactured goods, sugar, corn, &c. Tenedos, opposite the site of Troy, retains its antient name.

On the opposite side of this sea is Salonica, a large city of 70,000 inhabitants, at the head of a bay. The anchorage is good and the trade considerable, but there is no harbour. The islands Spezzia, Hydra, and Poros, which are near the coast of the Morea, have become distinguished of late years for maritime enterprise.

The coast of the Morea, the antient Peloponnesus, is mountainous, some of the summits exceeding 6000 feet. The country is verdant and of an agreeable aspect, but not well wooded; the productions are numerous, but the trade small. It was given up by the Turks in 1830, to form a part of the new kingdom of Greece. Corinth, at the head of an arm of the sea, and on the isthmus which joins Livadia to the Morea, formerly renowned as one of the most splendid and luxurious of cities, is now a small town exhibiting a few remains of its antient architecture. Athens, beyond the isthmus, is the most populous town of Greece, and has been increasing in importance since the commencement of the reign of Otho, the first king of Modern Greece. It is not a place of much trade.

The coast of Albania, including the antient Illyricum, is more mountainous and rugged: the natives are barbarous, and more athletic than those to the southward. It is now part of the kingdom of Greece; it has but little trade. The known harbours are Antivari, Dulcigno, Durazzo, Valona, Parga, and Prevesa. Off this coast and the Morea lie the Ionian Islands. The principal one, Corfu, the antient Corcyra, is the seat of government, which is carried on in the name of the Republic of the Seven Islands, and which is placed under the protection of Great Britain by the treaty of Vienna, 1814. Corfu is picturesque, fertile, and wooded. Cefalonia has a more dreary aspect: it contains a mountain 5380 feet high, which is a conspicuous seamark. Inside Cefalonia is Ithaca, now called Teaki, the native place of Ulysses. The fertile island of Zante, famous for its currants, is to the southward. Proceeding to the northward we enter the Adriatic, the entrance of which is 40 miles broad. The shores of Dalmatia and Istria afford numerous fine harbours, and are covered towards the interior with extensive forests of timber, much of which is fine oak. In Dalmatia is Ragusa, formerly a republic, and a neutral port, and whose flag, prior to the French revolution, was known even to our own shores. Above Ragusa the eastern shores are studded with islands affording good anchorage.

The Greeks, especially the Hydriotes, are active sailors. They employ small vessels, half decked, which both sail and pull, but they seldom venture to sea except in fine weather or with a fair wind. The trade to the Black Sea is chiefly carried on in Greek bottoms.

Trieste, the chief port of Austria, is a large and handsome city, and a place of great trade. It exports wool, tobacco, and the produce of the mines of Hungary. It is a free port.

Venice, founded in the fifth century upon numerous small low islands at the mouth of the Po, celebrated as the entre-

pôt of the commerce between Europe and the Levant, which was at its maximum about the fourteenth century, is still a place of considerable trade, though its wealth and commerce have declined. The chief exports are corn, timber, silk, glass, &c. It has very fine and extensive fisheries. Off Malamocco, the port of Venice, is a bar, across which line-of-battle ships built there have been conveyed in a kind of floating-dock called a camel. During the melting of the snows in spring the freshes of the Po render the waters nearly fresh or brackish to a considerable distance at the head of the Adriatic. This sea is subject to hard northerly gales, called *boras*, especially in winter, which last three days, giving warning of their approach. These winds are very dangerous on the Italian or western shore to leeward. The coasting trade of the Adriatic is chiefly carried on in Austrian vessels and those of the Papal States. The vessels employed are mostly trabaculos, a kind of lugger, and seltees, small vessels of one mast. The chief ports of the coast of Italy which bounds the west side of the Adriatic are Ancona and Brindisi. Ravenna, formerly celebrated as a port, is now five miles inland.

The kingdom of Naples, which forms the south part of Italy, is remarkably fertile, and abounds in beautiful scenery. Its chief exports are olive-oil, silk, and wine. Naples, the capital, would become a place of great trade, but for the system of duties and commercial restrictions. The bay of Naples, with Vesuvius rising to the height of 3880 feet, the city along the shore, the clear Italian sky reflected in the expanse of water, the picturesque islands, and that brilliancy of general effect which is due to the increase of light caused by an approach of some degrees towards the equator, is one of those places which our tourists are fond of describing; but to the eye familiar with the gorgeous magnificence of the tropics, the spectacle is one of lesser dignity. The island of Sicily is one of the most fertile in the world, but under the joint effects of demoralization, bad laws, and the indolence of the government, its resources are not developed. Among the chief sources of commerce is the tunny fishery. These fish enter the Mediterranean in the spring, keeping by the European shore, and leave it again at the close of the year by the coast of Africa. They are caught in nets so contrived that the fish are driven into small compartments, where they are struck and killed. The sword-fish is pursued and struck with a spear having a line fast to the head, with which the fish is played till it is wearied out, in the manner described by Strabo (i. 24, Casaub.). Anchovies are taken along the shores of Sicily, and the murex purpura is found. Messina is the great commercial city and port, on the site of the antient Zancle. Scylla is considered in these days as an ordinary rock, but Charybdis is a vortex which might, on occasions, prove dangerous to a small vessel. The chief danger of the Faro is now considered to be merely the baffling winds in a current running from two to five miles an hour, in water too deep for anchoring, and subject to sudden squalls. Messina is famous for the optical illusion called *fata morgana;* and on the coasts a sudden rising and subsidence of the water is experienced, which is called *marobia*. There are no harbours on the south coast, which is low. The spacious harbour of Syracuse on the east coast is often used as a refuge in gales of wind. In the river, the Anapus, the papyrus grows abundantly. The seamen of Sicily are hardy and courageous. Mount Ætna, 10,880 feet high, is a conspicuous object in these seas. Among the Lipari or Æolian Islands is the constantly burning mountain of Stromboli, which rises like a steep cone from the sea, and is a very interesting object at night. Ustica produces the best vegetable soda.

The principal port on the west coast, and the chief commercial city of Italy, is Leghorn, which is a free port, and one of the principal depôts for wheat from the Black Sea. The principal exports are silk, oil, Carrara marble, alabaster, straw for hats, and wine. The coasting trade is carried on in small Italian vessels. Genoa, once the capital of a republic, but now a Sardinian province, is celebrated for the number and beauty of its marble edifices. The harbour is artificial. The port is free, and the commerce increasing. The chief productions are olive-oil, rice, velvet, &c. The sailors are said to be among the hardiest of the Mediterranean.

The sea to the south-west of Italy was antiently named from the Tyrrhenians, who are among those nations who once possessed the maritime power of the Mediterranean.

The chief port on the south coast of France is Marseille, at the mouth of the Rhône, said to have been founded by a colony of Phocæans, who, from the great trading facilities of the place, extended their possessions along the shores on both sides. Amongst these are Frejus, where Bonaparte embarked for Elba in 1814; and Cannes, where he landed from Elba in 1815. The Marseillois have been renowned as navigators. The principal exports are silk and wines; there is a great and increasing trade; and from 5000 to 6000 ships arrived in 1831. In the freshes of the Rhône the fresh water may be skimmed far out at sea. Lord Exmouth's fleet watered in this manner in the late war.

Toulon is the great naval arsenal of France. The Gulf of Lions, like all the gulfs on the north shores of the Mediterranean, is subject to violent gales from the northward, which sometimes last three days.

The islands of Sardinia and Corsica, lying north and south, extend over 80 leagues of the sea between Genoa and Tunis. The climate of Sardinia is mild, and the soil fertile. It exports corn, salted provisions, and fruit. The natives of the interior are savage. The Sardinians have few vessels of their own, the trade, even to the fisheries, being carried on by foreigners, principally Genoese. The shipping is chiefly French from Marseille. Corsica is mountainous, rising in some parts upwards of 8000 feet: it produces nearly the same articles as Sardinia, together with marbles and precious stones. Ajaccio, situated on the bay of the same name, is remarkable as the birthplace of Bonaparte. The small island of Malta, composed chiefly of calcareous sandstone, is, from its situation in the narrow sea between Sicily and Africa, and its excellent harbour, the great naval station of the Mediterranean, and second in importance to Gibraltar. The island is productive, and the population dense. Malta was ceded to the English in 1814. The Maltese are active sailors and expert divers; their vessels are small and open.

The east coast of Spain presents numerous harbours, and a highly fertile but not well wooded coast. The chief products are wine and olives and wool. The coast is particularly adapted to navigation by steam-vessels; but the disturbed state of the country, and the commercial restrictions, which do not allow foreign steam-vessels to ply, keep the trade in a very low state. The chief ports are Valencia, which is a very handsome city; Cartagena, which is one of the finest harbours in the world; Barcelona, not adapted to large ships; Alicant, and Malaga.

The Balearic Islands, Majorca, Minorca, with Iviza, one of the Pityusæ, now under the Spanish government, produce wine, corn, fruit, and some manufactures. The chief harbours are Palma and Port Mahon.

Gibraltar, standing at the foot of a rocky mountain, 1430 feet high, is a place of extraordinary strength. From its situation, and the narrowness of the straits dividing Spain from Africa, which are only eleven miles across, Gibraltar is the key of the Mediterranean, and has been the object of violent contests, the last of which terminated in 1783, leaving it in the possession of the British. It is a free port, but not a place of very great trade, and smuggling is extensively carried on. A constant current sets through the Straits of Gibraltar from the Atlantic at the rate of two or three miles an hour, and is felt as far as Cabo de Gata in Spain, 150 miles distant. Dr. Halley supposed this current required to supply the loss by evaporation, considering that the rivers which flow into this sea were not sufficient for the purpose. The writers of the 'Encyclopédie Methodique,' on the other hand, maintained that the waters carried off by evaporation, and returned again in the form of rain, would be precisely the same for the sea outside and inside the straits; and that the numerous rivers of the Mediterranean, by bringing down the waters of distant mountainous regions, would cause a supply in excess, which would require an outward current to carry it off. It had been taken for granted that the water of the Mediterranean must be salter than that of the ocean, in consequence of the continual supply of this current, and it had been stated to be so in the proportion of 41 to 38. Dr. Marcet however found no difference. The saltness furnishes the solution of the difficulty, and Mr. Tennant suggested that a comparison of the density at great depths would decide the fact of a contrary or outward current below, since, if the density or increase of saltness increased with the depth, it would naturally follow that a much slower current below would be sufficient to carry off the excess of salt left by evaporation. Capt. Smyth, at the suggestion of Dr. Wollaston, obtained water

from the depth of 400 or 500 fathoms, and at 450 and 680 miles from the straits, in which Dr. Marcet detected no increase of salt; but in the water drawn from 670 fathoms depth, at only 50 miles from the strait, he found four times the usual quantity of saline matter; from which it would appear that a current below of only three-quarters of a mile an hour would prevent any increase in the saltness of the sea. It may be worth while to mention also that a story is told of a ship which sunk at Ceuta, opposite Gibraltar, having reappeared two miles farther to the westward. (*Phil. Trans.*, 1819, 1822, 1829.)

Tangier is a seaport of Marocco. Ceuta, opposite Gibraltar, is a fortress of great strength. The African shore from this place to Tripoli is hilly, and in some places sandy and sterile; but the country in the interior is highly fertile, though without woods. Algiers, the capital of a kingdom or state, is a place of great strength.

Tunis, the most populous city of Africa after Cairo, stands at the bottom of an extensive bay, from which it is separated by a shallow lake of intense saltness, from the continued evaporation under a hot sun, and on which are seen great numbers of flamingoes of a brilliant red plumage. The chief trade is with Marseille, to which the inhabitants export corn, the product of these fertile countries now, as it was in the days of antient Carthage. The ruins of Carthage, east of Tunis, and distant 10 miles, with the cisterns, where the ground is strewed with small thin pieces of verd antique and red porphyry, are not the remains of the antient city, but of that which was built afterwards by the Romans.

It is remarkable that on the low shelving shores of parts of these coasts the strong northerly winds do not blow home, and that accordingly a ship may bear up on a lee shore and anchor in smooth water.

Tripoli is the capital of the state of the same name.

Proceeding towards Barca, the antient Ptolemais, we pass the Gulf of Sydra, or Greater Syrtis, an object of so much dread to the antient seamen on account of marshes and sea-monsters. Capt. Smyth, who examined this coast, found that these terrors were poetical exaggerations of the difficulties of navigating a low and dangerous bight. Passing the desert shores of Libya, we arrive at Alexandria, founded on a sandy neck of land by Alexander the Great, whose sagacity pointed out the situation as eminently adapted to commerce.

Alexandria, which was one of the greatest commercial cities that ever existed, began to decline with the invasion of Egypt by the Saracens. Under these warlike people the maritime trade of the East passed to the shores of Syria, and Alexandria further declined as Cairo flourished. The trade however is still considerable: the chief exports are cotton, flax, drugs, spices, &c. The ports of Cairo, on the low and fertile shores of the delta at the mouth of the Nile, are Rosetta and Damietta. Fresh water may be skimmed two or three miles outside the Damietta mouth.

The navigation of the Mediterranean must no doubt be of very early date. The story of Minos destroying pirates (Thucyd., i. 4) takes for granted the fact, that there must have been merchant vessels carrying something worth stealing from the earliest recorded period. If with Strabo we take for granted the accuracy of Homer's descriptions, it by no means follows that the Greeks knew everything that could have been known to every other nation at that time; and the stories told of the jealousy with which the Phœnicians and Carthaginians guarded their discoveries, prove at least that geographical knowledge was not common property; and with regard to these very nations, the knowledge which the Greeks could have had of them, among other barbarians, must have been inferior to that which we possess in the minute accuracy of the Scriptures alone. The story of Utica having been established 130 years before Carthage, proves a regular communication between this place and Syria at a distance of upwards of 1200 miles; and we may conclude that occasional voyages of these enterprising people had already extended the bounds of knowledge far beyond these limits.

If the precise time of the discovery of places lying, as it were, in the thoroughfare of this sea, is so uncertain, the histories of the places in the deep bays of the northern shores must be still more obscure: we shall therefore give at once a slight sketch of the geography of this sea from Strabo, who wrote in the first century.

The stadium adopted by Strabo was that of Eratosthenes, 700 stadia making 1° of latitude or of longitude on the equator, or 60 nautical miles; hence a stadium is 0·0857 of a nautical mile, this last being about 6082 feet.

The Mediterranean was divided into three basins: the first comprised the sea between the Columns of Hercules and Sicily; the second, between Sicily and Rhodes; and the third, between Rhodes and the shores of Syria.

Strabo supposed that the parallel of latitude of 36½° passed through the Sacred Promontory (Cape St. Vincent), between the Pillars of Hercules (or Gibraltar and Ceuta), dividing this part of the Mediterranean in the middle of its breadth, which was believed by navigators to be 5000 stadia, or 429 nautical miles, from the gulf of Lions to the shore of Africa, but which measures only 330. The sea here however lies altogether to the north of this parallel; and hence, as the configuration of the European shores seems to have been tolerably good, the coast of Africa must have been proportionally distorted. This parallel was carried through the straits of Sicily, Rhodes, and the gulf of Issus, now the gulf of Scanderoon.

In consequence of the above supposition, he placed Marseille to the southward instead of the northward of Byzantium. He supposed Sardinia and Corsica to lie north-west and south-east instead of north and south, and made the distance of Sardinia from the coast of Africa 2400 stadia, or 205 miles, instead of 100, which is the true distance. From the Columns of Hercules to the straits of Sicily he considers to be 12,000 stadia, or 1028 miles: it is only about 800.

From Cape Passaro (Pachynum) to the west extreme of Crete he considered 4500 stadia, or 386 miles; it measures 400: and he supposed the length of Crete 2000 stadia, or 171 miles, the true length being 140 miles. He supposed that a line drawn through Byzantium, the middle of the Propontis, the Hellespont, and along the capes of the coast of Asia Minor, would coincide with the meridian: this error placed Byzantium too far to the north, and not far enough to the east. From Alexandria to the east end of Crete he considered 3000 stadia, or 257 miles: it measures about 290. From Alexandria to Rhodes he made 3600 stadia, or 308 miles: it measures 320. He supposed the head of the Greater Syrtis to be 1000 stadia, or 86 miles, to the south of Alexandria: it is about 60. From Cape Acamas (the west point of Cyprus) to Cape Khelidonia, he made 1900 stadia, or 163 miles; it measures 120 and from Cape Pedalium (Cape Greco) to Berytus (Beyroot), he made 1500 stadia, or 129 miles; it measures 90. From Rhodes to Issus he considered 5000 stadia, or 429 miles· it measures 400.

Many of the latitudes given by Strabo are very near, that is, within 10′; those of Marseille and Byzantium excepted, the former being 3° 43′ too little, and the latter 2° 16′ too much. The longitudes, which were all at that time referred to Cape Sacrum as the first meridian, and the extreme west point, as was believed, of the known world, are without exception too small; that of Carthage, the nearest to the truth, being 1° 9′, and Alexandria, the most erroneous, 6° 40′, too small.

Fruit is an important article in our Mediterranean trade: fast-sailing vessels are therefore employed to carry it, and a premium is paid to the first vessel arriving in the port of London after a certain period from the commencement of the season. Formerly all the British trade to the Levant was carried on by the Turkey Company. This was an open Company, and was abolished in the reign of Geo. IV.

This sea is navigated by vessels of no great size. There is a form of rig peculiar to the larger vessels, called *polacca*, which has originated in the suddenness and frequency of squalls, which often require the sail to be instantly taken in: for this purpose the masts are made in one piece, and the topsails, on being lowered, can slide down without interruption. The Mediterranean, being studded with places of refuge, and in which gales, though frequent and violent, never last so long as to wear the ship or the spirits of the men, and in which, besides, vessels have from the earliest times to the present ceased to navigate in the winter months, may indeed be favourable to training men to a certain degree of expertness in managing boats, but could never originate that seamanship on the grand scale which the long and boisterous sea-voyages, the rugged and dangerous coasts, and long winter nights, force upon the hardier sailors of the northern regions.

The winds have been remarked as peculiarly variable in the Mediterranean, and three or four vessels have often been seen carrying different winds at the same time. The

scirocco, or south-east wind, has always been noted throughout the Mediterranean for its depressing effects upon the animal system, and for a prejudicial influence still more surprising in other ways, as upon paint newly laid on, which does not dry afterwards. It is usually accompanied with a gloomy sky and haze. In winter its effects are but slightly perceived. Water-spouts are very common, and in the month of September the writer of this article saw sixteen together at one time.

The depth of the Mediterranean is without doubt very great, the sea being in most places unfathomable; and, unlike many other great expanses of water (as the Yellow Sea, the Baltic, and the English Channel), soundings are comparatively of limited utility.

The Mediterranean, though poetically termed a 'tideless sea,' is not strictly so; since in its latitudinal extent between Venice and the Lesser Syrtis it experiences a rise and fall of from five to seven feet. Tides are also felt, but somewhat irregularly, on the sides of the Gibraltar current, in the gulf of Corinth, and in the Faro of Messina; and there is a curious reciprocal motion in the waters in the channel of the Euripus, between Greece and Negropont. Strong currents occur, especially near Venice and the Faro of Messina. The Archipelago currents are noticed in the articles ARCHIPELAGO and EUBŒA. A westerly current sets along the coast of Karamania. It has been stated that an easterly current prevails constantly along the coasts of Africa and Egypt, but this, we believe, has not been substantiated.

The Mediterranean has been the scene of some very important naval actions. The first sea-fight on record was that between the Ionians and their own colony Corcyra, 644 B.C. The first engagement by sea which has been described was that between the Persians, in the reign of Darius, and the confederate Asiatic Greeks, before Miletus, 493 B.C. Thirteen years after this was the famous battle of Salamis, in which the fleet of Xerxes was destroyed. Numerous sea-fights took place between the Greeks and Persians, and amongst the Greeks themselves, and also between the Romans and Carthaginians. Among the latter was the action in which the Carthaginians were beat by the Romans under Duillius, 260 B.C., and which was the first action of the Romans at sea. The most curious circumstance recorded, namely, that the Romans were entirely unpractised in sea affairs, may have been a very good addition to their story; but it is a matter which we receive with some reservation, since, as every one knows, a mere landsman cannot even stand up in a boat on the sea without holding on. To this list may be added the battle of Actium, 30 B.C., in which Augustus triumphed over Antony and Cleopatra; that of 1203, in which the Latins, coming by sea, took Constantinople; the battle of Lepanto, in 1571, in which Cervantes fought; the battle of Sir George Byng, in the Faro of Messina, in 1718; the drawn battle of Admiral Byng, off Mahon, in 1756; the battle of the Nile, in 1798, in which Nelson cut off the communication between France and the expedition under Bonaparte, and destroyed the French naval power in the Mediterranean; the passage up the Dardanelles, by Sir T. Duckworth, in 1808, to force the Turks to agree to a peace with Russia, which object he failed to effect, though he destroyed part of their fleet. In 1816 Lord Exmouth, with the combined Dutch and English fleets, bombarded Algiers, and forced the dey to liberate the Christian prisoners. The last action of importance was that in the bay of Navarino, in which the combined English, French, and Russian squadrons destroyed the Turkish and Egyptian fleets, which was followed by the emancipation of Greece and the invasion of Turkey by the Russians.

Though the several parts of the Mediterranean must long have been intimately known to those frequenting particular places, yet a general and accurate knowledge of its shores is the result of the improved navigation of our own times. In 1783 Tofiño, the Spanish hydrographer, made a survey of the coasts of Spain and the Balearic Islands, in which he employed chronometers. In 1802 Galiano, captain of a Spanish frigate, obtained several chronometric differences between important stations, as Naples, the Levant, Alexandria, the Bosporus, and the coast of Africa. In 1811 Captain Beaufort surveyed with great accuracy the coast of Karamania in Asia Minor; his further proceedings were stopped by his being dangerously wounded. About three years afterwards Captain Smyth commenced, on his own responsibility, in a Sicilian gunboat, his extensive and valuable surveys of great part of the shores both of Europe and Africa, which he completed in the Adventure in 1824, and which have appeared in his chart of the Mediterranean. In 1816 M. Hell, with French officers of engineers, made a detailed survey of Corsica; and M. Gauttier extended a series of triangles over the Archipelago. He also determined by chronometers many positions on the Black Sea. A trigonometrical survey of the Morea was made in 1829-31 by the French under General Pelet, and the west coast of Asia Minor has been completed by Lieutenants Graves and Brock, of the royal navy, who are employed in completing the hydrography of the Archipelago and the remaining coasts. Some points of the coast of Syria were determined by M. Gauttier, and plans of particular ports have been furnished by our own officers, but a regular survey of this coast does not exist.

(Strabo; Gosselin, *Géogr. des Grecs;* Beaufort, *Karamania;* Smyth, *Sicily, Sardinia;* M'Culloch, *Commer. Dict.; Connaissance des Tems*, &c.)

MEDLEPAD. [ANGERMANLAND.]

MEDOC. [GIRONDE.]

MEDULLA OBLONGA'TA. [BRAIN.]

MEDULLA SPINA'LIS. [NERVOUS SYSTEM.]

MEDULLIN, a name which has been given by Dr. John to the pith of the sunflower, &c.; but it does not appear that its properties have been sufficiently examined to entitle it to be considered as a peculiar principle.

MEDU'SA (Zoology), the Linnean name for a genus of simple or free *Acalephans* [ACALEPHÆ, vol. i.], vulgarly known to the British by the name of *Sea-blubbers* or *Sea-nettles*, extremely transparent, difficult to observe in their native element, and still more difficult to preserve, from their gelatinous and easily-decomposed texture. These beautiful but evanescent animals are extremely numerous, swarming on many of our coasts and in our æstuaries, and occurring in almost all latitudes. Péron and Lésueur, Lamarck, Cuvier, Escholtz, and others, have attempted their arrangement with more or less success, and the last-named author divides them into six families, *Rhizostomidæ, Medusidæ, Geryonidæ, Oceanidæ, Æquoridæ*, and *Berenicidæ*. M. de Blainville makes them the second class, *Arachnodermata*, of his *Actinozoaria*, and subdivides them into two orders, depending on the absence or presence of a solid piece as a support for the umbrella-like body of the animal. The genera of his order *Cirrhigrada* (the 2nd) are provided with this solid piece [CIRRHIGRADA, vol. vii.]; but those of his first order, *Pulmograda*, have no such support. Under the *Pulmograda* he arranges the numerous sections of the *Medusæ*, and under that title the reader will find a sketch of the most approved systems, and a description and illustration of some of the most remarkable forms, as far as our limits will permit. [PULMOGRADA.]

MEDWAY. [KENT.]

MEERMAN, GERARD, was born at Leyden in 1722, and in 1748 became pensionary of Rotterdam. He spent the greater part of his life in learned research, chiefly relating to law. He died at Aix-la-Chapelle, December 15, 1771. His two great works were, his 'Novus Thesaurus Juris Civilis,' &c., 7 vols. fol., 1751-53 (to which his son added an eighth volume in 1780), and his 'Origines Typographicæ,' 2 vols. 4to., Hagæ, 1765. An analysis of this last work was published in 'The Origin of Printing, in two Essays,' 8vo., Lond., 1774, by Messrs. Bowyer and Nichols; the main object of which was to establish the claim of the town of Haarlem to the invention of printing. (*Biogr. Universelle*, tom. xxviii.)

MEERMAN, JOHN, son of the preceding, was born in 1753. His earliest literary effort was made at the age of ten years, in a translation into Dutch of the 'Mariage Forcé' of Molière. He commenced his regular studies at Leyden, and afterwards prosecuted them at Leipzig under Ernesti, and at Göttingen under Heyne. At different times in his life he visited nearly every country of Europe. His supplement (in an eighth volume) to his father's 'Thesaurus Juris Civilis' has been already mentioned. The more important of his other works were: 'Specimen Juris Publici de Solutione Vinculi quod olim fuit inter sacrum Romanum Imperium et Fœderati Belgii res publicas,' 4to., Leyden, 1774; 'A History of William, Count of Holland, King of the Romans,' in Dutch, 5 vols. 8vo., 1783-97; 'Remarks during a Tour in Great Britain and Ireland,' 8vo., Hague, 1787; 'An Historical Account of the Prussian, Austrian, and Sicilian Monarchies,' 4 vols. 8vo., Hague, 1793-4;

'Historical Account of the North and North-East of Europe,' 6 vols. 8vo., Hague, 1804-6; 'A Narrative of the Siege and Conquest of Leyden by John duke of Bavaria, in 1420,' 8vo., Leyden, 1806; all in Dutch. He also published 'Hugonis Grotii Parallelon rerum publicarum, liber tertius de moribus ingenioque populorum, Atheniensium, Romanorum, Batavorum,' with a translation into Dutch, 3 vols. 8vo., 1801-2, and 'Grotii Epistolæ ineditæ,' 8vo., 1806. In 1812 he published, in Dutch and French, a poem entitled 'Montmartre,' and in the same year a 'Discourse on the First Travels of Peter the Great, principally in Holland,' 8vo. His last publication was a translation into Dutch of Klopstock's 'Messiah.'

Under Louis Bonaparte, as king of Holland, he was made Director of the Fine Arts and Minister of Public Instruction, and was entitled to the gratitude of his country for the zeal and success with which he prosecuted his functions. Afterwards, when Holland became united to France, he was made a count of the empire and senator by Napoleon. He died August 15, 1815. The Meerman Library was sold by auction in 1824, and produced no less a sum than 131,000 florins.

(*Biogr. Univ.* tom. xxviii.; *Gent. Mag.* vol. lxxxvi., p. i., p. 639.)

MEERSCHAUM, a magnesian mineral found in the island of Samos and Negropont (Eubœa), in the Archipelago, &c. It is said to be employed as fullers' earth in the Turkish dominions, and in the manufacture of tobacco-pipes.

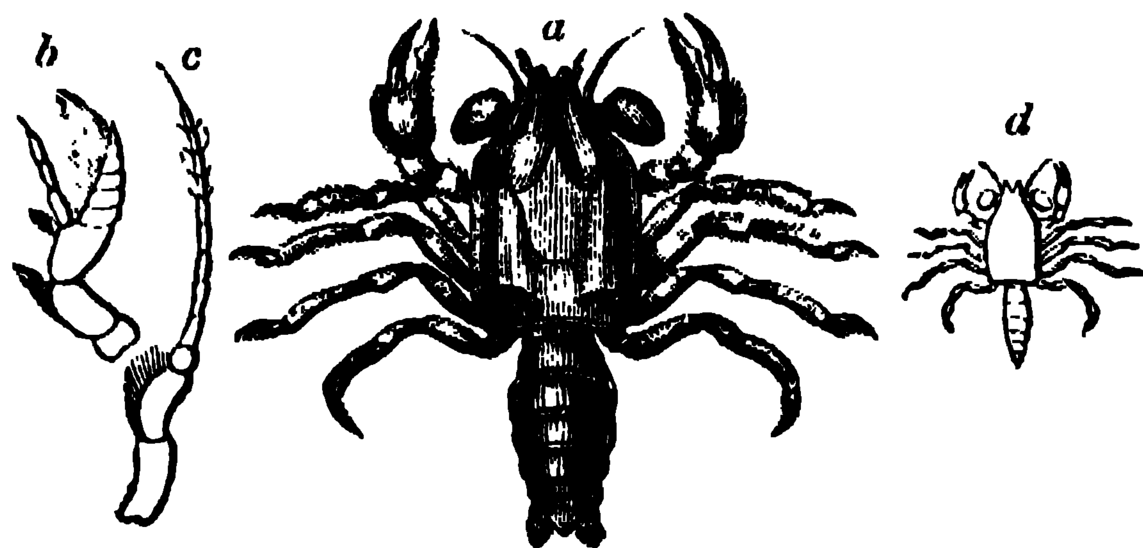
MEGADERMA. [CHEIROPTERA, vol. vii., p. 24.]

MEGADESMA, a name given by Bowdich to a genus of fresh-water *Conchifera* (*Potamophila* of Sowerby, *Galathea*, Lam.).

MÊGADHÛTA. [CALIDASA.]

ME'GALONYX. [MEGATHERIIDÆ.]

MEGALO'PA, Dr. Leach's name for a genus of Macrurous crustaceans (*Macropa* of Latreille).



Megalopa mutica.
a, Magnified; *b*, internal antenna; *c*, external antenna; *d*, natural size.

The external antennæ are setaceous, hardly one-fourth so long as the carapace, and formed of elongated joints; the intermediate ones terminated by two bristle-like appendages, the upper of which is the longest. External *jaw-feet*, with the two first joints compressed, the second the shortest, and notched at the end for the insertion of the others. Anterior feet equal, in form of didactylous pincers, rather short and stout; four last pair rather shorter, less stout, and terminated by a single nail, which is a little curved. *Carapace* short, wide, and a little depressed, terminated in front by a pointed rostrum, which is wide at the base, and sometimes inflected. *Eyes* very large, supported on a very short peduncle. *Abdomen* narrow, extended, linear, composed of seven joints, of which the five intermediate ones are provided with appendages, viz. the four first with false feet, having their external division very large and ciliated, and the fifth, on each side, with a horizontal blade or lamina, which is oval and ciliated, composing, with the last joint, a sort of fin, differing a little from that of the other *Macrura*.

Example, *Megalopa mutica*. This species differs from the others in having the rostrum a little inflected perpendicularly on the carapace and canaliculated in the middle; also in the absence of a recurved spine on the haunches of all the feet. The shell is truncated posteriorly, and has no point like that of *Megalopa armata*. Colour brownish.

Locality.—Found by MM. Audouin and Adolphe Brongniart at the mouth of the Loire.

ME'GALOPHUS. [MUSCICAPIDÆ.]

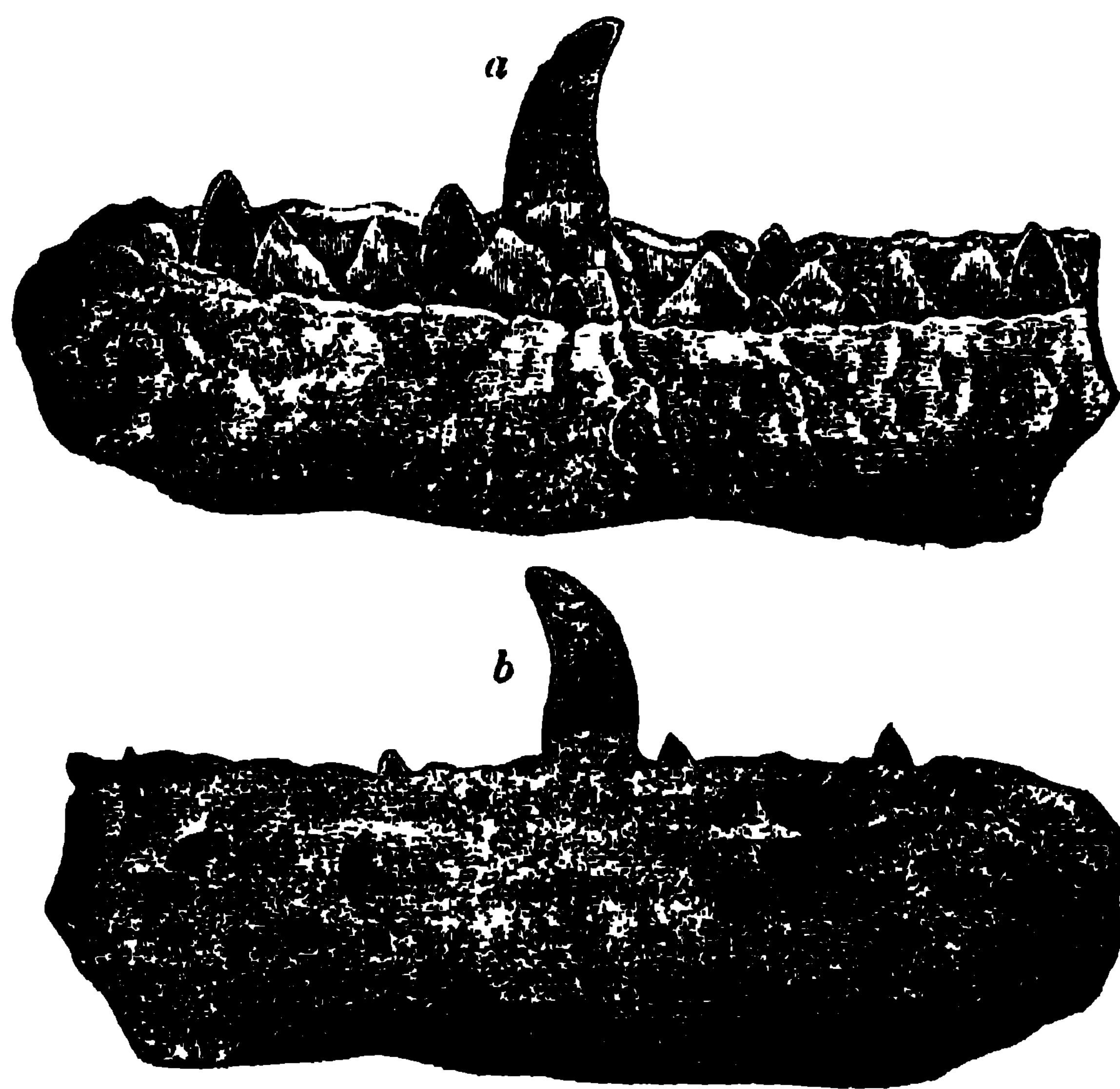
MEGALO'POLIS. [ARCADIA.]

MEGALOSA'URUS, the name assigned by Dr. Buckland and the Rev. W. Conybeare to an extinct genus of Saurians found in the oolitic slate at Stonesfield near Woodstock and other localities.

Though no entire skeleton has yet been discovered, the number of bones and teeth collected give sufficient data to enable the observer to pronounce upon the general osseous structure, with almost as great a certainty as would be the result of the examination of the bones of the animal in a perfect and connected state.

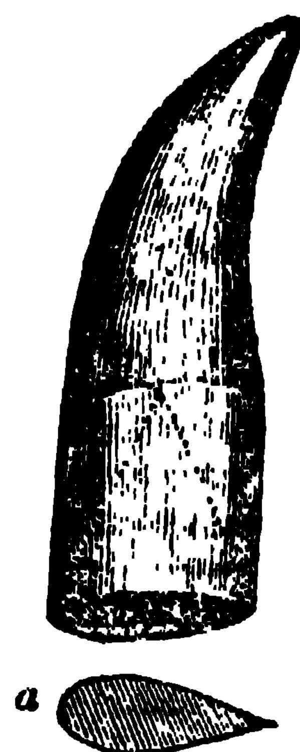
The femur, or thigh-bone, and tibia, or leg-bone, are nearly three feet in length severally, so that the entire hind-leg must have been nearly two yards long, and the discovery of a metatarsal bone measuring thirteen inches indicates that the foot was of a corresponding length. From these and other remains, including the vertebræ, teeth, &c., the size of this gigantic saurian has been calculated and its habits ascertained.

'The most important part of the Megalosaurus yet found,' observes Dr. Buckland, in his 'Bridgewater Treatise,' 'consists of a fragment of the lower jaw, containing many teeth.'



Anterior extremity of right lower jaw of Megalosaurus, from Stonesfield, one fourth natural size. *a*, View of the inside; *b*, view of the outside. (Buckland.)

'The form of this jaw shows that the head was terminated by a straight and narrow snout, compressed laterally like that of the *Delphinus Gangeticus*.'



Tooth of Megalosaurus, two-thirds natural size. The dotted lines indicate the compressed conical cavity, containing pulp, within the root of the growing tooth. *a*, Transverse section of the same, showing the manner in which the back and sides are enlarged, and rounded in order to give strength, and the front is brought to a strong and thin cutting edge.

The structure of these teeth, another of which is figured in the article MACHAIRODUS, leaves no doubt as to the carnivorous habits of this immense extinct lizard; and the internal structure of the cylindrical and other bones shows that it was a terrestrial animal, though it may have occasionally taken to the water in pursuit of prey, such as Plesiosauri and fishes. Its ordinary food is supposed to have been the smaller reptiles, crocodiles, and tortoises, whose remains occur abundantly in the strata where those of Megalosaurus abound.

The admirable adaptation of the teeth for carnivorous purpose is beautifully pointed out by Dr. Buckland in the treatise above quoted.

The same author so long ago as the year 1824 figured the fragment of jaw above alluded to and other bones of this saurian, and thus speaks of it in the 1st vol. of the 'Geological Transactions' (2nd series). 'Although the known parts of the skeleton are at present very limited, they are yet sufficient to determine the place of the animal in the zoological system. Whilst the vertebral column and extremities much resemble those of quadrupeds, the teeth show the creature to have been oviparous, and to have belonged to the order of saurians, or lizards. The largest thigh-bone of this animal in the Museum at Oxford is two feet nine inches long, and nearly ten inches in circumference at its central or smallest part. From these dimensions, as compared with the ordinary standard of the lizard family, a length exceeding forty feet and a bulk equal to that of an elephant seven feet high have been assigned by Cuvier to the individual to which this bone belonged; and although we cannot safely attribute exactly the same proportions to recent and extinct species, yet we may with certainty ascribe to it a magnitude very far exceeding that of any living lacerta. Large as are the proportions of this individual, they fall very short of those which we cannot but deduce from a thigh-bone of another of the same species, which has been discovered in the ferruginous sandstone of Tilgate Forest, near Cuckfield in Sussex, and is preserved in the valuable collection of Gideon Mantell, Esq., of Lewes,* together with many other bones belonging to the same species, and of the same size with those from Stonesfield. The femur in question, which has lost its head and lower extremity, measures in its smallest part, at the distance of two feet from its extremity, more than twenty inches in circumference, and therefore, when entire, must have equalled in magnitude the femur of the largest living elephant. To judge from the dimensions of this thigh-bone, its former possessor must have been twice as great as that to which the similar bone in the Oxford Museum belonged; and, if the total length and height of animals were in proportion to the linear dimensions of their extremities, the beast in question would have equalled in height our largest elephants, and in length fallen but little short of the largest whales: but as the longitudinal growth of animals is not in so high a ratio, after making some deduction, we may calculate the length of this reptile from Cuckfield at from sixty to seventy feet.'

In Cuvier's opinion *Megalosaurus* partook of the structure of the crocodile and the monitor. See also Mantell's *Geology of Sussex*; Cuvier, *Ossemens Fossiles*; and *Geol. Trans.*, vol. iii. (2nd series).

Besides the localities above mentioned we may notice the occurrence of this animal in the oolite of Normandy; Forest marble, Caen; Jura, near Solothurn? (H. Von Meyer.)

MEGAPODIIDÆ,† Mr. Swainson's name for a family of *Rasores*, consisting of the genus *Menura*, the subgenus *Megapodius*, and the genera *Dicholophus*, *Psophia*, and *Crax*, with the subgenera *Crax*, *Ourax*, *Ortalida*, *Penelope*, and *Lophocerus*. An account of *Dicholophus* will be found under the title CARIAMA; and *Psophia* is described under that of AGAMI, with the synonym of *Trophia crepitans*, an error for the Linnean name *Psophia crepitans*. For a description of MÆNURA see the article. *Megapodius* and the other genera are treated of under the title CRACIDÆ, *Lophocerus* being the *Galeated Curassow*, but thus distinguished subgenerically by Mr. Swainson:—'Front of the head with an elevated, pear-shaped, horn-like protuberance. Bill intermediate in shape, between *Crax* and *Ourax* Cere small. Nostrils basal, oval or round.'

Example, *Crax galeata*.

The genus *Ourax*, as restricted by Mr. Swainson, who gives *Ourax erythrorhynchus* as the type, appears to be the *Ourax Mitu* of Cuvier and others.

MEGARIAN SCHOOL. After the death of Socrates the majority of his disciples retired to Megara (Diog. Laert. ii. 106, iii. 6), where Euclid, one of the oldest of them, resided. [EUCLID.] A few of these disciples remained at Megara with Euclid, who was looked upon as the founder of a school of philosophy which is usually known by the name of Megarian. In this school the Eleatic philosophy was taught, modified to some extent by the doctrines of Socrates. The Megarian philosophers maintained that the Supreme Good was always the same and unchangeable. They were distinguished in later times by their dialectic subtlety, and by the invention and solution of sophisms; on which account they were called Eristici (ἐριστικοί) and Dialectici (διαλεκτικοί). (Diog. Laert., ii. 106.)

The most celebrated of the successors of Euclid were, Eubulides of Miletus, who opposed certain opinions of Aristotle; Diodorus, surnamed Cronos, who was originally of Iassus in Caria, a pupil of Eubulides, and who lived in Egypt in the time of Ptolemy Soter; and Stilpo, who was originally of Megara, but afterwards resided at the court of Ptolemy Soter.

(Ritter's *History of Antient Philosophy*, b. vii., part i., c. 5; F. Deycks, *De Megaricorum Doctrina*, &c., Bonn, 1827.)

MEGARI'MA, the name proposed by Rafinesque for those species of *Terebratula* which are nearly equivalve and smooth, as *T. lævis*, *T. crassa*, &c.

ME'GARIS, one of the political divisions of antient Greece, was separated from Bœotia on the north by the range of Mount Cithæron, and from Attica on the east and north-east by the high land which descends from the north-west boundary of Attica, and terminates on the west side of the bay of Eleusis in two summits, formerly called Kerata, or the Horns, and now Kandili. [ATTICA.] Megaris was divided from the Corinthian territory on the west by the Oneian range of mountains, through which there were only two roads from Corinth into Megaris: one of these, called the Scironian Pass, which is the steep escarpment of the mountains which terminate on the coast of the Saronic gulf, passed by Crommyon (Strabo, p. 391), and along the side of the escarpment was the direct road from Corinth to Athens. This road was made wide enough by the emperor Hadrian for two vehicles abreast (Pausan., i. 40, § 10), but at present it only admits a single vehicle, except in a few places (Thiersch, *De l'Etat Actuel de la Grèce*, ii. 32); yet the road on the whole is in good condition. The other road, following the coast of the Corinthian gulf, crossed the Geranean mountains, which belong to the Oneian range, and led to Pegæ, on the Corinthian gulf, and thence into Bœotia.

The extreme breadth of Megaris, from Pegæ to Nisæa on the Corinthian gulf, is reckoned by Strabo at 120 stadia (p. 334); and the area of the country is calculated by Mr. Clinton, from Arrowsmith's map, at 720 square miles (*Fasti Hell.*, ii., p. 385), which is about the area of the county of Worcester. Megaris is a rugged and mountainous country, and contains only one plain of small extent, in which the capital, Megara, was situated. The rocks are chiefly, if not entirely, calcareous. The country is very deficient in springs.

Megara was built on two hills, on the summit of each of which was a citadel, named respectively Caria and Alcathous. (Paus., i. 40, § 5; i. 42, § 1.) It was connected with the port of Nisæa by two walls, which were built by the Athenians when they had possession of Megara, B.C. 461-445. (Thucyd., i. 103.) The length of these walls is said by Thucydides (iv. 66) to have been eight stadia, and by Strabo (p. 391) to have been eighteen stadia. Pausanias has described at considerable length the public buildings which existed in Megara in his time; but scarcely any remains of them can now be traced. According to Procopius (*Bell. Vandal.*, i. 1) Megara was 210 stadia from Athens. Dion Chrysostom calls it a day's journey. Dodwell reckons it an eight hours' journey from Athens. (*Class. Tour*, ii. 177.) In front of the harbour of Nisæa was a little island called Minoa, which was occupied by the Athenians during the Peloponnesian war. (Thucyd., iii. 51.) Strabo, in speaking of Minoa, observes, that 'after passing the Scironian rocks we come to the promontory Minoa, which forms the port of Nisæa.' This apparent though not real discrepancy between Thucydides and Strabo has been made to appear greater than it is by translating the Greek word (ἄκρα)* 'peninsula' instead of 'promontory;' which latter term is quite consistent with Minoa being an island, or at least is by no means contradictory to the statement of Thucydides and Pausanias that it was an island. The positions of Minoa and Nisæa seem to be satisfactorily identified by Lieutenant Sprat (*London Geographical Journal*, vol. viii., p. 205).

The port of Pagæ or Pegæ on the Corinthian gulf was

* This collection has been purchased by the nation; and is now in the British Museum.

† In Mr. Swainson's work, 'Classification of Birds,' the words are 'Family Megapodinæ. Greatfoots;' but 'Megapodinæ' must be an error of the press, the termination of that word being used to indicate a subfamily.

* The reading should be, apparently, δέκα ἢ ὀκτώ, instead of δέκα καὶ ὀκτώ.

the only other place in Megaris of any importance. Tripodiscus, situated on the road from Pegæ to Megara, is mentioned by Thucydides (iv. 70) and Strabo (p. 394), and is said by Plutarch (*Qu. Gr.*, xvii., p. 387) to have been one of the five hamlets (κῶμαι) into which Megaris was originally divided; the names of which were, Heræa, Piræa, Megara, Cynosuria, Tripodiscus.

According to the traditions preserved by Pausanias (i. 39, § 4, 5), Car, the son of Phoroneus, originally reigned at Megara, and was succeeded, after the lapse of twelve generations, by Lelex, who gave to the people the name of Leleges. Lelex was succeeded by Cleson, and Cleson by Pylas. By the marriage of Pylas with the daughter of Pandion, Megara became annexed to Attica; and there can be no doubt that Megaris in early times belonged to Attica, since it is represented on the best authority that Megaris formed one of the four antient divisions of Attica. On the death of Pandion, Megaris fell to the lot of his son Nisus; but it was wrested from the Athenians during the reign of Codrus, when the Dorians invaded Attica. A Corinthian colony was settled at Megara, and the country was from this time regarded as a Dorian state. It remained for some time subject to Corinth; but it afterwards asserted its independence, but at what time is uncertain. Its wealth and power rapidly increased, as is evident from the numerous colonies which it planted, of which the most important were Selymbria, Chalcedon, and Byzantium, on the Bosporus and the Propontis, and Hyblæan Megara in Sicily. The navy of Megara was once powerful enough to cope with that of Athens; and it was only after a long and obstinate struggle that the Athenians were enabled to recover the island of Salamis, which had been seized by the Megarians.

The government was originally in the hands of the great Dorian landholders; but they were deprived of their power by Theagenes, who put himself at the head of the popular party, and obtained the sovereignty, about B.C. 620. He adorned the city with several public buildings. (Paus., i. 40, 41.) He married his daughter to Cylon, who was assisted by him in his attempt to usurp the government of Athens. (Thucyd., i. 126.) Theagenes was at length expelled from Megara; and shortly afterwards a most violent struggle arose between the aristocratic and democratic parties, of which a vivid picture is drawn in the poems of Theognis, a native of Megara, who appears to have been born shortly before the death of Solon, and to have lived down to the beginning of the Persian wars.

For some time after the Persian wars Megara appears to have been constantly engaged in war with Corinth; and her enmity to Corinth was the occasion of her forming an alliance with Athens, about B.C. 461. (Thuc., i. 103.) Athenian garrisons were placed in Megara and Pegæ; but six years afterwards the Megarians renounced their alliance with Athens, and put to death the Athenian garrison at Megara (Thuc., i. 114.) In the seventh year of the Peloponnesian war the democratic party formed a plan for surrendering the city to Athens, which was defeated by the arrival of Brasidas with a Lacedæmonian force. We read little more of Megara in Grecian history. In B.C. 357, democracy was again the established constitution. (Diod., xv. 40.) Megara was taken and almost destroyed by Demetrius; it was also taken by the Romans under Metellus (Paus., vii. 15, § 4); it suffered greatly in the invasion of Alaric (Procop., *Bell. Vand.*, i. 1); and its ruin was completed by the Venetians in 1687.



Coin of Megaris.
British Museum. Actual size.

MEGASPI'RA, Mr. Lea's name for a pupiform, terrestrial, testaceous mollusk, remarkable for the length of the spire of its shell, which consists of twenty-three close-set, narrow, gradually increasing whorls, which he thus characterises generically:—

Shell clavate; aperture nearly oval, below rounded; margins reflected, above disjoined; columella many-folded, below entire, not effuse.

Animal unknown.

P. C., No. 920.

This genus, which is closely analogous to the genera *Bulinus*, *Pupa*, and *Auricula*, according to Mr. Lea, is founded on a single species, *Megaspira Ruschenbergiana*.

Description. Shell subcylindrical, turrited, thickly striate, brownish, with longitudinal reddish-brown spots, having a solid apex; whorls twenty-three, rather flattened; spire obtuse at the apex; columella with four folds; outer lip reflected.



Megaspira Ruschenbergiana. (Lea.)

MEGA'STHENES lived in the time of Seleucus Nicator, king of Syria, who sent him on an embassy to Palibothra, the capital of Sandracottus, king of the Prasii. The territories of Sandracottus were on the Ganges and the Jumna. Megasthenes stayed in India several years, and on his return recorded his observations in a work entitled 'Indica.' Of this work, which is unfortunately lost, there are extracts in Strabo, Arrian, and Ælian. Though Strabo has on several occasions expressed an unfavourable opinion of the trustworthiness of the author, it is quite certain that the work contained much valuable information which was then entirely new to the Greeks. Megasthenes gave the first account of Trapobane, or Ceylon.

MEGA'STOMA. [SHRIKES.]

MEGATHE'RIIDÆ, Megatheroids of Owen, who includes under the family the following genera of extinct *Edentata*, viz. *Megatherium*, *Megalonyx*, *Glossotherium*, *Mylodon*, and *Scelidotherium*, all of which have as yet been found in America only.

Megatherium. (Cuvier.)

A gigantic extinct mammiferous quadruped, more nearly allied to the Ant-eaters and Sloths than to the Armadillos. The dental formula cannot be definitely stated, because the number of teeth in the lower jaw is not known. The upper jaw, as Mr. Owen has shown, contains five on each side, and from the analogy of *Scelidotherium* it may be conjectured that *Megatherium* had only four teeth on each side in the lower jaw. In that case the formula would be

$$\text{Incisors } \frac{0}{0};\ \text{canines } \frac{0}{0};\ \text{molars } \frac{5-5}{4-4} = 18.$$

Cuvier pointed out the skull of this animal as very much resembling that of the Sloths, but observed that the rest of the skeleton bore a relationship partly to the Sloths and partly to the Ant-eaters. The Madrid specimen was for a long time the principal, if not the only source of information with regard to the genus, and as Mr. Clift remarks in his paper, to which we shall presently allude more largely,* that magnificent though imperfect skeleton had remained for the last century altogether unique. 'Very few additional specimens,' says that able osteologist, 'appear to have been sent to Europe, and no other cabinet save the solitary one at Madrid possessed (as far as I am able to learn) a single intelligible fragment which could with certainty be assigned to this great unknown.' The zeal and energy of Sir Woodbine Parish have added greatly to the materials for arriving at a just conclusion as to the proper place of this animal in the series; and the history of the Megatherium may now be considered to be complete.

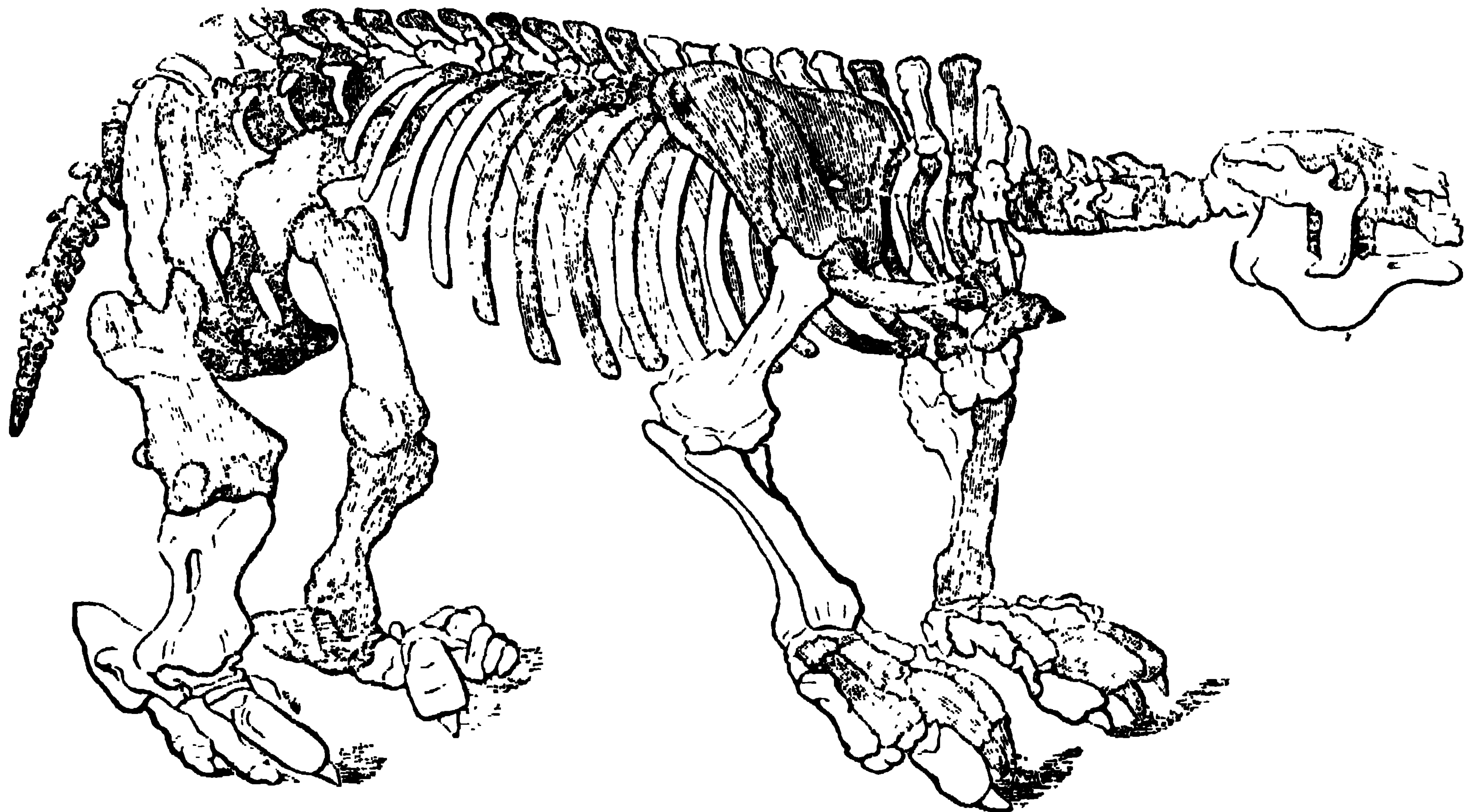
According to the description of Don Joseph Garriga,† Spain possessed considerable parts of at least three different skeletons. The first and most complete is that which is preserved in the royal cabinet at Madrid. This was sent over in 1789, by the Marquis of Loreto, viceroy of Buenos Ayres, with a notice stating that it was found on the banks of the river Luxan, west-south-west of Buenos Ayres. In 1795 a second arrived from Lima, and other portions, probably not very considerable, were possessed by Father Fernando Scio, who had received them as a present from a lady who had come from Paraguay. According to MM. Pander and D'Alton, they were unable in 1818 to find any traces of the Lima specimen, or that which had belonged to Fernando Scio.

* 'Some account of the Remains of the Megatherium sent to England from Buenos Ayres, by Woodbine Parish, Jun., Esq., F.G.S., F.R.S.,' by William Clift, Esq., F.G.S., F.R.S.

† 'Descripcion del esqueletto de un quadrupedo muy corpulento y raro que se conserva en el real gabinete de l'historia natural de Madrid.' (Madrid, 1796.)

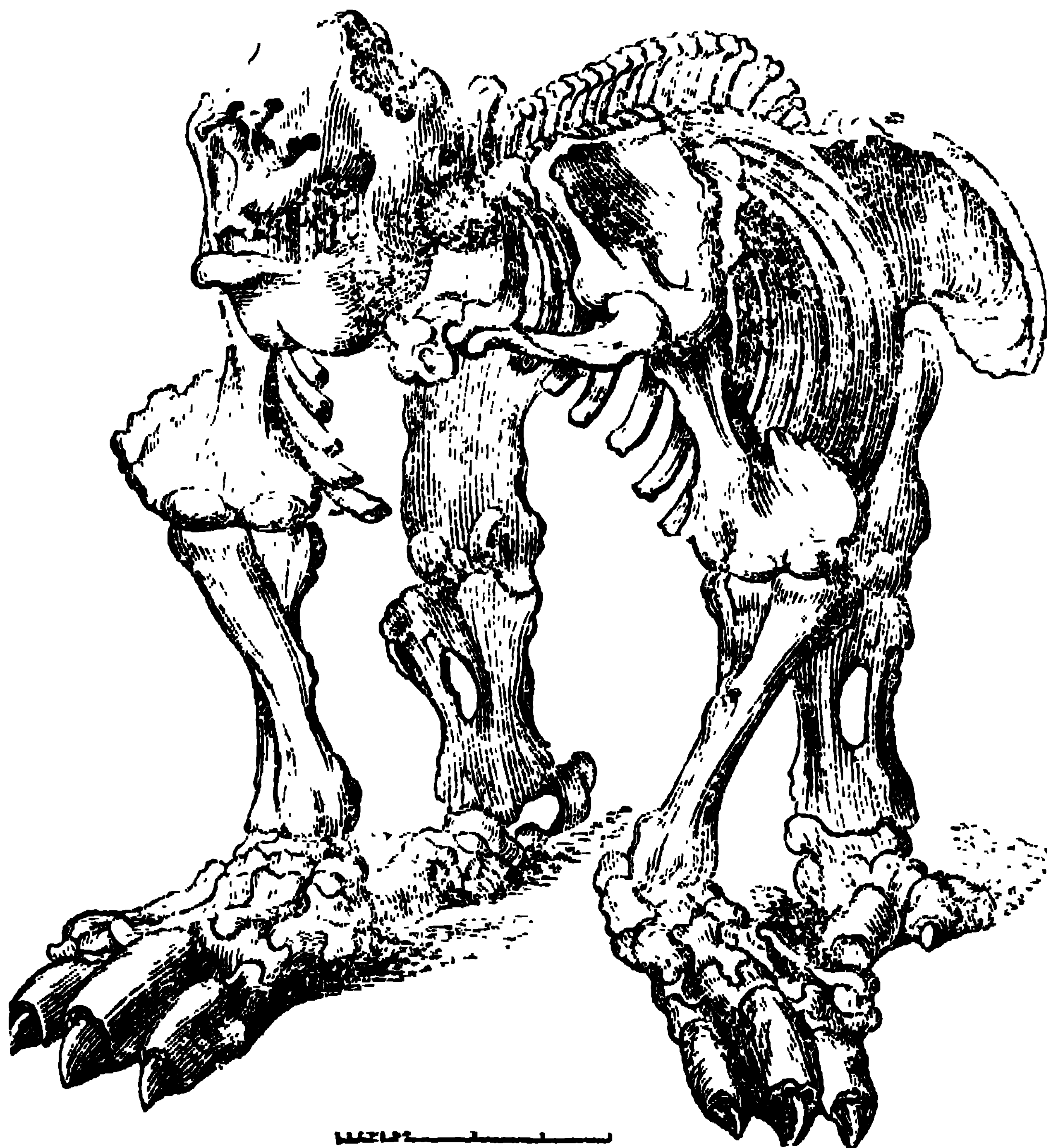
The remains collected by Sir Woodbine Parish were found in the river Salado, which runs through the flat alluvial plains (the Pampas) to the south of the city of Buenos Ayres, after a succession of three unusually dry seasons, 'which lowered the waters in an extraordinary degree, and exposed part of the pelvis to view, as it stood upright in the bottom of the river.' This and other parts, having been carried to Buenos Ayres by the country people, were placed at the disposal of Sir Woodbine Parish by Don Hilario Sosa, the owner of the property on which the bones were found. A further inquiry was instituted by Sir Woodbine Parish, and, on his application, the governor, Don Manuel Rosas, granted assistance, the result of which was the discovery of the remains of two other skeletons on his excellency's properties of Las Averias and Villanueva; the one to the north, the other to the south of the Salado, but at no great distance from the place where the first had been found. 'An immense shell or case was found with the remains discovered on the properties of Don Manuel, portions of which were brought to this country, but most of the bones associated with the shell crumbled to pieces after exposure to the air,' and the broken portions preserved had not been sufficiently made out, when Mr. Clift published his memoir, to enable that zoologist to describe them satisfactorily; but he gives very accurate figures of a portion of the shell.

The cuts here given will convey to the reader more accurately than words the osseous structure of this enormous animal, which, when full grown, must have been more than fourteen feet long including the tail, and upwards of eight feet in height.



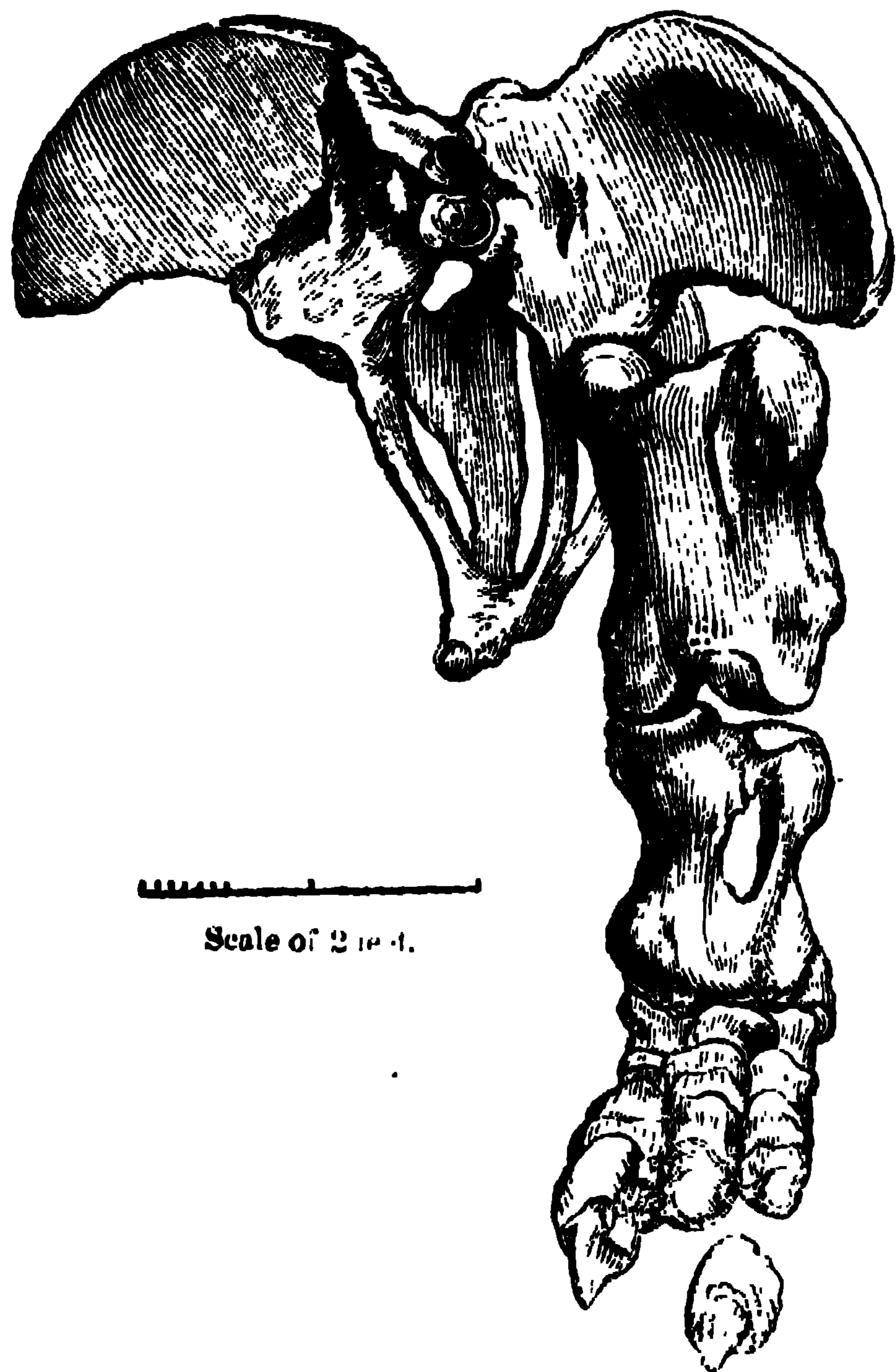
Skeleton of Megatherium. (Clift.)

The simple outline (from Pander and D'Alton) shows the extent of the skeleton at Madrid. The pale tint expresses the extent of corresponding parts sent to England by Sir Woodbine Parish. The dark tint shows the additional parts, which are deficient in the Madrid skeleton. (*Geo. Trans.*)

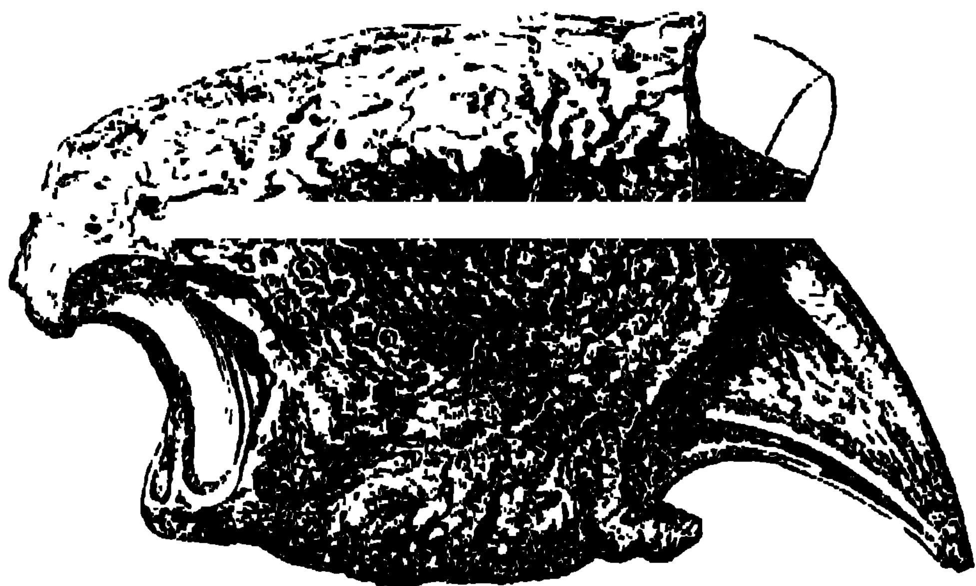


Scale of 2 feet.

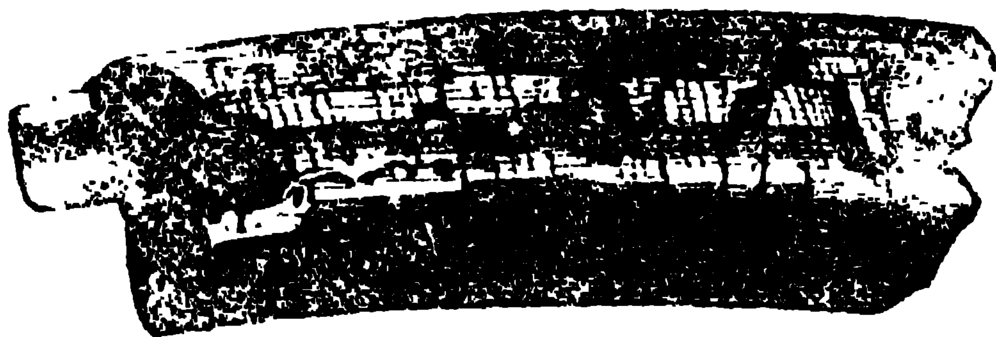
Skeleton of Megatherium foreshortened, showing a nearly front view of the head and anterior and posterior extremities. (Pander and D'Alton.)



Bones of the pelvis of Megatherium, discovered by Sir Woodbine Parish, now in the Museum of the Royal College of Surgeons, London. The bones of the left hind leg and several of those of the foot are restored nearly to their natural place. (Dr. Buckland, 'Bridgewater Treatise.')



Ungueal phalanx of Megatherium, one-fourth natural size. (Clift.)



Tooth of Megatherium, one-third natural size. (Clift.)

The thigh-bone was twice the thickness of that of the largest elephant; the fore-foot must have measured more than a yard in length, and more than twelve inches in width, and was terminated by an enormous claw, and the width of the upper part of the tail could not have been less than two feet. The following comparative measurements, furnished by Mr. Clift, will be found in Sir Woodbine Parish's interesting forthcoming work,* where a highly characteristic figure of the skeleton, drawn from the original bones, under Mr. Clift's superintendence, shows the parts which are wanting.

	Elephant. ft.	in.	Megatherium. ft.	in.
The expansion of the ossa ilia . .	3	8	5	1
Breadth of the largest caudal vertebra	0	7	1	9
Circumference of middle of femur .	1	0	2	2
Length of the os calcis . . .	0	7½	1	5

The whole of the structure of this extinct animal is admirably adapted for digging the earth so as to enable it to obtain the succulent roots, which, in all probability, constituted the principal part of its food. The snout of the animal appears to have terminated in a short proboscis, which must have borne a good deal of resemblance in its proportions to that of the modern Tapirs.

* 'Buenos Ayres and the Provinces of the Rio de la Plata,' 8vo., London.

We have seen that an immense shell or case accompanied the remains discovered to the north and the south of the river Salado; and Dr. Buckland was led to suppose, not without considerable apparent ground for the opinion, that this shell was the armour that protected the *Megatherium*.

'The size of the Megatherium,' says Dr. Buckland, in his 'Bridgewater Treatise,' 'exceeds that of the existing Edentata, to which it is most nearly allied, in a greater degree than any other fossil animal exceeds its nearest living congeners. With the head and shoulders of a Sloth, it combined in its legs and feet an admixture of the characters of the Ant-Eater, the Armadillo, and the Chlamyphorus; it probably also still further resembled the Armadillo and Chlamyphorus, in being cased with a bony coat of armour. Its haunches were more than five feet wide, and its body twelve feet long and eight feet high;* its feet were a yard in length, and terminated by most gigantic claws: its tail was probably clad in armour, and much larger than the tail of any other beast among extinct or living terrestrial Mammalia. Thus heavily constructed, and ponderously accoutred, it could neither run, nor leap, nor climb, nor burrow under the ground, and in all its movements must have been necessarily slow: but what need of rapid locomotion to an animal whose occupation of digging roots for food was almost stationary? And what need of speed for flight from foes, to a creature whose giant carcass was encased in an impenetrable cuirass, and who, by a single pat of his paw, or lash of his tail, could in an instant have demolished the Couguar or the Crocodile? Secure within the panoply of his bony armour, where was the enemy that would dare encounter this Leviathan of the Pampas? or in what more powerful creature can we find the cause that has effected the extirpation of his race? His entire frame was an apparatus of colossal mechanism, adapted exactly to the work it had to do; strong and ponderous, in proportion as this work was heavy, and calculated to be the vehicle of life and enjoyment to a gigantic race of quadrupeds, which, though they have ceased to be counted among the living inhabitants of our planet, have, in their fossil bones, left behind them imperishable monuments of the consummate skill with which they were constructed. Each limb and fragment of a limb forming co-ordinate parts of a well adjusted and perfect whole; and through all their deviations from the form and proportion of the limbs of other quadrupeds, affording fresh proofs of the infinitely varied and inexhaustible contrivances of creative wisdom.' Much of this eloquent passage is unassailable: but Professor Owen has demonstrated most clearly, and, we have reason to believe, to the entire satisfaction of Dr. Buckland himself, that the tessellated shell or case found with the Salado remains did not belong to the Megatherium, whose tegumentary covering seems to have been not unlike that of the Ant-eaters and Sloths, but to a Dasypodoid or Armadillo-like gigantic extinct animal, to which Mr. Owen has assigned the name of *Glyptodon*, whose hind-foot, like the fore, appears to be expressly modified to form a base to a column destined to support an enormous incumbent weight; whilst in the *Megatherium* the toes were free to be developed into long and compressed claws, such as form the compensating weapons of defence of the hair-clad Sloths and Ant-eaters. Mr. Owen, in his paper read to the Geological Society of London, entitled 'A description of a tooth and part of the skeleton of the Glyptodon, a large quadruped of the Edentate order, to which belongs the tessellated bony armour figured by Mr. Clift in his "Memoir on the remains of the Megatherium brought to England by Sir Woodbine Parish," showed that the portions of tessellated armour described and figured by Weiss (*Berlin Trans.*, 1827) are identical in structure with those brought to England by Sir Woodbine Parish, and that the bones which were found with the armour in both cases are the same in their characters, and therefore that they belonged to animals specifically identical. He next entered upon the inquiry, Had the Megatherium a bony armour? and he concluded, from a comparison of its skeleton with that of the Armadillos, that it had not. In the pelvis of the Armadillo there are twelve sacral vertebræ anchylosed together, and the spines of the vertebræ are greatly developed anterio posteriorly, forming a continuous vertical ridge of bone, bearing immediately the superincumbent

* See above, p. 66.

weight. In the Megathere the sacral vertebræ are only four in number, and are not anchylosed, and the spinous processes are comparatively small, not locked together, as in the Armadillos, but separated by intervals as in the Sloths. In the Armadillos, the weight of the cuirass is transferred from the sacrum to the thigh-bones by two points on each side. One of them, the ischium, is anchylosed to the posterior part of the sacrum, the other point is formed by the conversion of the iliac bone into a stout three-sided beam passing straight from the thigh-joint to abut against the anterior part of the sacrum, where the weight of the shell is greatest, a structure which is wanting in the Megathere. In no species of Armadillo is the ilium expanded, while in the Megathere it is greatly developed, resembling that of the Elephant in size, form, and position; and among the Edentata the nearest approach in this portion of the skeleton is to be found among the Sloths and Ant-eaters. The most striking point however in the structure of the Armadillos, with reference to the support of a bony covering, is the remarkable production of a part of the vertebra from above the anterior articular process on each side, in a straight direction upwards, outwards, and forwards, to nearly the level of the true spinous processes. Now these oblique processes, which are developed only in the loricated Edentata, beautifully correspond in form and use with the tie-bearers in the architecture of a roof, and are entirely wanting in the Megathere, the structure of this part of the vertebral column of that animal corresponding with the character of the vertebræ of the hair-clad Sloths and Ant-eaters. Mr. Owen noticed other supposed adaptations in the skeleton of the Megathere to sustain a bony covering, as the breadth of the ribs, but the ribs of the Sloths and Ant-eaters are broader than those of the Armadillos.

The paper contained a tabular account of the discovery of twelve skeletons of the Megathere, and in no instance did any portion of bony armour occur with or near the bone.* A notice was also given of the remains of a Glyptodon, found in the left bank of the Pedernal before its junction with the Sala, an affluent of the Rio Santo, near Monte Video, and preserved in the museum of that town. From the accounts which have been given of these remains, they appear to have belonged to the same species as that described in the paper. An allusion was also made to some portions of bony armour obtained in the Rio Seco, in the Banda Oriental, and similar in structure to the specimen of the Pedernal. One of the portions was the covering for the tail. It was hollow to its extremity, and presented in its concavity vestiges of caudal vertebræ very distant from each other.

In conclusion, Mr. Owen observes, that having brought together evidence of the remains of five specimens (found in the Rio Seco, Rio Janeiro, Villanueva, Pedernal, and the Banda Oriental) of a large Edentate species undoubtedly covered with armour, and more or less corresponding with the characters of the Glyptodon, and having established the characters of that genus on both dentary and locomotive organs; he trusts at the same time that he has vindicated the opinion of Cuvier with reference to the Megathere, by proving it to be, by its tegumentary covering as well as its osseous system, more nearly allied to the Ant-eaters and Sloths than to the Armadillos. (*Geol. Proc.*, 1839.)

May we venture a suggestion as to the immediate probable cause of the extinction of these and other gigantic quadrupeds whose remains are found in America? The southern parts of that great continent are even now subject to long continued droughts, sometimes lasting for three years in succession, and bringing destruction on the cattle; and, indeed, the discovery of the remains collected by Sir Woodbine Parish was owing to a succession of unusually dry seasons, as we have seen. The upright position of most of these skeletons found in situ, with the ponderous vertebræ and bones of the pelvis in their natural situation, indicates that the animal must have been bogged in adhesive mud sufficiently firm to uphold the ponderous bones after the decomposition of the soft parts. A long continued drought would naturally have brought these extinct animals from the drained and parched country to the rivers, dwindled, by the continued dry seasons, to a slender stream running between extensive mud banks, in which these gigantic quadrupeds may have been engulfed in their anxious efforts to reach the water.*

Megalonyx. (Jefferson.)

Under this name Mr. Jefferson, formerly President of the United States, described, from some bones found in caverns in the west of Virginia, an extinct mammiferous animal, which he considered to be carnivorous. The bones on which his description was founded were, a small fragment of a femur or a humerus, a complete radius, an ulna complete but broken in two, three claws,† and half a dozen other bones of the foot.

From the materials above mentioned, and on comparison with the analogous bones in the Lion, Mr. Jefferson came to the conclusion that the *Megalonyx* must have been upwards of five feet in height, that it must have weighed nearly nine hundred pounds, that it was the largest of Unguiculated animals, and that it was probably the enemy of the Mastodon of the Ohio, as the Lion is of the Elephant. When once a theory takes possession of the human mind, there is generally no want of materials to confirm it in the imagination of the theorist. Thus Mr. Jefferson appeals to certain figures resembling a Lion mentioned by the most antient historians of the Anglo-Americans as visible on a rock at the mouth of the Kanhawa, a branch of the Ohio, which must have been traced by the hands of the Indians from their rudeness; and to the accounts of travellers, some of them then living, who had heard during the night frightful roarings which terrified the dogs and the horses; and he asks if they do not prove the existence of some great unknown carnivorous species in the interior of America, and whether this redoubtable animal may not have been the *Megalonyx*?

Dr. Wistar, Professor of Anatomy in the University of Philadelphia, subsequently perceived some analogy between the bones of the fossil foot of Jefferson's animal and similar bones in the foot of the Sloth, without other aid than Daubenton's description.

Cuvier, who saw at once the true analogies of the animal, and was ridiculed for his opinion by Faujas de St. Fond, who mistook the clear-sightedness of that great zoologist for the blindness of one who would constrain nature to bend to the factitious classification of an artificial system, obtained casts of the bones indicated by Jefferson from Mr. Peale of Philadelphia, and was afterwards furnished by M. Palisot de Beauvois with two *morceaux* found in the same cavern where Jefferson's specimens were discovered: fortunately one of these was a tooth. With these additional materials Cuvier completed his labours, and satisfactorily showed that the *Megalonyx* belonged to the *Edentata*.

Mr. Owen, in his description of his genus *Mylodon*, says, 'The greater part of Cuvier's chapter on *Megalonyx* is devoted to the beautiful and justly celebrated reasoning on the ungueal phalanx, whereby it is proved to belong not to a gigantic Carnivore of the Lion kind, as Jefferson supposed, but to the less formidable order of Edentate quadrupeds; and Cuvier, in reference to the tooth,—the part on which alone a generic character could have been founded,—merely observes that it resembles at least as much the teeth of one of the great Armadillos as it does those of the Sloths. In the last edition of the "Règne Animal" Cuvier introduces the *Megatherium* and *Megalonyx* between the Sloths and Armadillos, but alludes to no other difference between the two genera than that of size,—"l'autre, le *Megalonyx*, est un peu moindre." Some systematic naturalists, as Desmarest and Fischer, have therefore suppressed the genus, and made the *Megalonyx* a species of *Megatherium*, under the name of *Megatherium Jeffersonii*. The dental characters

* Sir Woodbine Parish has just now (May 29, 1839) kindly communicated to us a letter received by him, giving information of the discovery of an almost entire skeleton of an adult *Megatherium* on the banks of the Rio de la Matanza, with all the vertebræ of the body, all the ribs, all the teeth, the head, and the legs, in short, with the whole of the bones except the tail and one foot. Close to it was the skeleton of a '*Tatou gigantesque*' (Glyptodon probably), with its bony armour complete. There was also found a very small and perfect *Megatherium* which must have been only just born at the epoch of destruction. No mention is made of any traces of bony armour or shell about the *Megatheria*. In the old animal only one foot is wanting. It has been suggested that the so-called young *Megatherium* may possibly be a skeleton of *Scelidotherium*.

* Mr. Darwin states that he was informed by an eye witness, that during the 'gran seco' the cattle in herds of thousands rushed into the Parana, and being exhausted by hunger, they were unable to crawl up the muddy banks, and were drowned. (*Voyages of the Adventure and Beagle between the years 1826 and 1836*,' vol. iii., 1839.) Sir Woodbine Parish says, 'In the last great drought, which continued during the summers of 1830, 31, and 32, it was calculated that from a million and a half to two millions of animals died:- the borders of all the lakes and streamlets in the province were long afterwards white with their bones.' (*Buenos Ayres and the Provinces of the Rio de la Plata*, 8vo, 1839.)

† The ungueal phalanx of Megalonyx is much more compressed than that of Megatherium.

of the genus *Megatherium* are laid down by Fischer, as follows:—"*Dent. prim.* et lan. $\frac{0}{0}$; molares $\frac{4-4}{4-4}$, obducti, tritores, coronide nunc planâ transversim sulcatâ, nunc medio excavatâ marginulis prominulis." That *Megalonyx* had the same number of molares as *Megatherium* (supposing that number in the Megathere to be correctly stated, which it is not) is here assumed from analogy, for neither Jefferson, Wistar, nor Cuvier,—the authorities for *Megalonyx* quoted by Fischer,—possessed other means of knowing the dentition of that animal than were afforded by the fragment of a single tooth.' (Owen, in *Zoology of H. M. S. Beagle.*)

The same author (*loc. cit.*) adds, 'With respect to existing Mammalia, most naturalists of the present day seem to be unanimous as to the convenience at least of founding a generic or subgeneric distinction on well-marked modifications in the form and structure of the teeth, although they may correspond in number and kind, in proof of which it needs only to peruse the pages of a *Systema Mammalium* which relate to the distribution of the Rodent order. According to this mode of viewing the logical abstractions under which species are grouped together, the extinct Edentate Mammal discovered by Jefferson must be referred to a genus distinct from *Megatherium*, and for which the term *Megalonyx* should be retained. This will be sufficiently evident by comparing the descriptions given by Cuvier of one of the teeth of *Megalonyx Jeffersonii*, and by Dr. Harlan of a tooth of his *Megalonyx laqueatus*, with those of the *Megatherium* which have been published by Mr. Clift. The fragment of the molar tooth of the *Megalonyx Jeffersonii*, described and figured in the 'Ossemens Fossiles,' seems to have been implanted in the jaw like the teeth of the Megatherium by a simple hollow base, similar in form and size to the protruded crown: its structure Cuvier describes as consisting of a central cylinder of bone enveloped in a sheath of enamel. The transverse section of this tooth presents an irregular elliptical form, the external contour being gently and uniformly convex; the internal one undulating, convex in the middle, and slightly concave on each side, arising from the tooth being traversed longitudinally on its inner side by two wide and shallow depressions. The imperfect tooth of the species called by Dr. Harlan *Megalonyx laqueatus*, and of which a cast was presented by that able and industrious naturalist to the Museum of the Royal College of Surgeons, resembles in general form, and especially in the characteristic double longitudinal groove on the inner side, the tooth of the *Megalonyx Jeffersonii*.'

Two claws of the fore-foot, a radius, humerus, scapula, one rib, an os calcis, a metacarpal bone, some vertebræ, a femur, and a tibia of *Megalonyx laqueatus*, which were discovered in Big-bone Cave, Tenessee, United States, are also described by Dr. Harlan,* who, though he does not enter into the question of the generic characters of *Megalonyx*, seems, as Mr. Owen observes, to feel that they do not rest entirely on dental modifications; for Dr. Harlan remarks that 'a minute examination of the tooth and knee-joint renders it not improbable, supposing the last-named character to be peculiar to it, that if the whole frame should hereafter be discovered, it may even claim a generic distinction, in which case either Aulaxodon or Pleurodon would not be an inappropriate name.' Upon this Professor Owen makes the following pertinent observation:—'There can be no doubt, as it appears to me, with respect to a fossil jaw presenting teeth in the same number and of the same general structure as in the *Megatherium*, and with individual modifications of form as well marked as those which distinguish *Megatherium* from *Megalonyx*, that the palæontologist has no other choice than to refer it, either as Fischer has done with *Megalonyx*, to a distinct species of the genus *Megatherium*, or to regard it as a type of a subgenus distinct from both. With reference however to the Pleurodon of Dr. Harlan, after a detailed comparison of the cast of the tooth on which that genus is mainly founded with the descriptions and figures of the tooth of the *Megalonyx Jeffersonii* in the "Ossemens Fossiles," they seem to differ in so slight a degree as to warrant only a specific distinction, and this difference even, viewing the various proportions of the teeth in the same jaw of the *Megatherium*, is more satisfactorily established by the characters pointed out by Dr. Harlan, in the form and proportions of the radius, than by those of the tooth itself.'

* 'Medical and Physical Researches,' p. 323, &c.

Among the bones collected by Spix and Martius in the cave of Lassa Grande, near the Arrayal de Torracigos in Brazil, and described by Professor Doellinger,† there were no teeth, and only a few bones of the extremities. The Professor concludes from their shape, the presence of an osseous sheath for the claw, and the form of their articulation, that they doubtless belong to a Megatheroid animal of the size of an Ox. The bones, according to the Professor, are not those of an immature individual, and agree sufficiently with Cuvier's descriptions and figures of the *Megalonyx* to warrant their being referred to that kind of animal.

Glossotherium. (Owen.)

This genus is founded on a fragment of a cranium in Mr. Darwin's collection, discovered in the bed of the same river in Banda Oriental with the skull of the *Toxodon*. The fragment includes the parietes of the left side of the cerebral cavity, the corresponding nervous and vascular foramina, the left occipital condyle, a portion of the left zygomatic process, and, though last, not least, the left articular surface of the lower jaw. No tooth, no locomotive extremity, was present to lend its aid; and yet, upon the slender materials above stated, Professor Owen has been enabled to give generic distinction to the animal to which they belonged, and to fix its place in the animal series satisfactorily.

Professor Owen remarks, that the importance of the articular surface of the lower jaw in the determination of the affinities of a fossil animal has been duly appreciated since the relations of the motions of the lower jaw to the kind of life appointed for each animal were pointed out by Cuvier; but he observes that we should be deceived if we were to establish, in conformity with the generalization laid down by Cuvier, our conclusion, from this surface, of the nature of the food of the extinct species under consideration; for the shape of the glenoid cavity is such as to allow the lower jaw free motion in a horizontal plane from right to left, and forwards or backwards, like the movements of a millstone: 'Nevertheless,' continues Mr. Owen, 'I venture to affirm it to be most probable that the food of *Glossotherium* was derived from the animal and not from the vegetable kingdom, and to predict, that when the bones of the extremities shall be discovered, they will prove the Glossothere to be not an ungulate but an unguiculate quadruped, with a fore foot endowed with the movements of pronation and supination, and armed with claws, adapted to make a breach in the strong walls of the habitations of those insect societies upon which there is good evidence, in other parts of the present cranial fragment, that the animal, though as large as an ox, was adapted to prey.'

The data on which Professor Owen rests this affirmation are, in the first place, a remarkable cavity situated immediately behind the tympanic bone, of nearly a regular hemispherical form and an inch in diameter. The surface of this cavity does not appear to have been covered with articular cartilage, because it is irregularly pitted with many deep impressions, and Mr. Owen concludes therefore that it served to afford a ligamentous attachment to the styloid element of a large *os hyoides*. In addition to this evidence of the size of the bones of the tongue, there is a more certain indication of the extent of its soft and especially its muscular parts in the magnitude of the foramen for the passage of the lingual or motor nerve, which anterior condyloid foramen is larger than any of those which perforate the cranium, with the exception of the great foramen; it is eight lines in the long diameter, and readily admits the passage of the little finger.

The professor remarks that it is only in the Ant eaters and Pangolins that we find an approximation to these proportions; and that in the Giraffe, the largest of ruminants, and having the longest and most muscular tongue in that order, the foramen for the corresponding nerve is scarcely more than one fourth the size of that of *Glossotherium*. In the other parts of the cranium Mr. Owen finds more decisive evidence of the relationship of this extinct edentate to the genera *Myrmecophaga* and *Manis*

The question, Had the Glossotherium teeth? is answered by the Professor in the affirmative, from the rugged surface of the temporal fossa indicating an extensive temporal muscle; from the well-defined boundary, formed by

† Spix and Martius, 'Reise in Brazil,' band ii., p. 5.

a slightly-elevated bony ridge, extending to near the sagittal suture; the size of the zygomatic portion of the temporal bone, and the remains of the oblique suture by which it was articulated to the malar bone; and he is of opinion that they will probably be found to be molar teeth of a simple structure, as in the *Orycteropus*.

Here is evidence of the existence of an *os malæ*. This bone is wanting in the Pangolins; in the true Ant-eaters it does not reach the zygomatic process of the temporal bone. From this evidence of the completion of the zygomatic arch, the Professor concludes that *Glossotherium* was more nearly allied to the Armadillos and *Orycteropus;* and from the form and loose condition of the tympanic bone, which, through the care and attention of Mr. Darwin, was preserved *in situ*, that the affinity of the animal was closer to *Orycteropus* than to the Armadillos: but the tympanic bone of *Orycteropus* differs from that of *Glossotherium* in forming part of the circumference of an ellipse whose long axis is vertical, and in sending outwards from its anterior part a convex eminence, which terminates in a point directed downwards and forwards: in the distance from the origin of the zygoma to the occipital plane, which is relatively greater in *Glossotherium* than in *Orycteropus*, the former is more similar to *Myrmecophaga* and *Manis*.

The internal surface of the cranial fragment shows that in *Glossotherium*, as in other *Bruta*, the cerebellum must have been almost entirely exposed behind the cerebrum, that the latter was of small relative size, not exceeding that of the Ass; and that it was chiefly remarkable, as in *Orycteropus*, the Ant-eater, and Armadillo, for the great development of the olfactory ganglia.

Such are the leading points on which the establishment of this extinct genus is placed. Our limits do not admit of our following out the interesting details which confirm the view taken by Mr. Owen, and which the reader will find in his 'Fossil Mammalia,' as part of the 'Zoology of the Voyage of Her Majesty's Ship Beagle, under the command of Captain Fitzroy, R N., edited and superintended by Mr. Darwin, and published with the approval of Her Majesty's Treasury;' but we think it advisable, with reference to the succeeding fossil species described by the Professor, and here noticed, to give the concluding paragraph in his paper on *Glossotherium*.

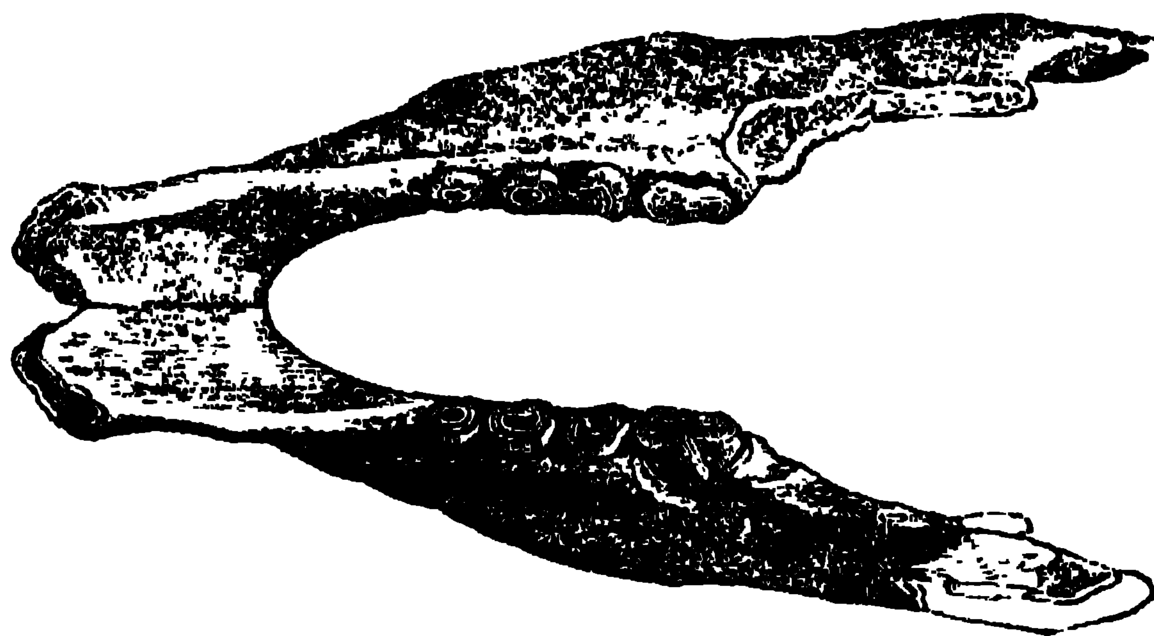
'A question,' says Professor Owen, 'may arise after perusing the preceding evidence, upon which the present fossil is referred to a great Edentate species nearly allied to the *Orycteropus*, whether one or other of the lower jaws, subsequently to be described, and, in like manner, referrible, from their dentition, either to the *Orycteropodoid* or *Dasypodoid* families of *Edentata*, may not have belonged to the same species as does the present mutilated cranium. I can only answer, that those jaws were discovered by Mr. Darwin in a different and very remote locality; that no fragments or teeth referrible to them were found associated with the present fossil; and that, as it would be therefore impossible to determine from the evidence we have now before us which of the two lower jaws should be associated with *Glossotherium;* and as both may, with equal, if not greater probability, belong to a totally distinct genus, it appears to me to be preferable, both in regard to the advancement of our knowledge of these most interesting *Edentata* of an antient world, as well as for the convenience of their description, to assign to them, for the present, distinct generic appellations.'

Mylodon. (Owen.)

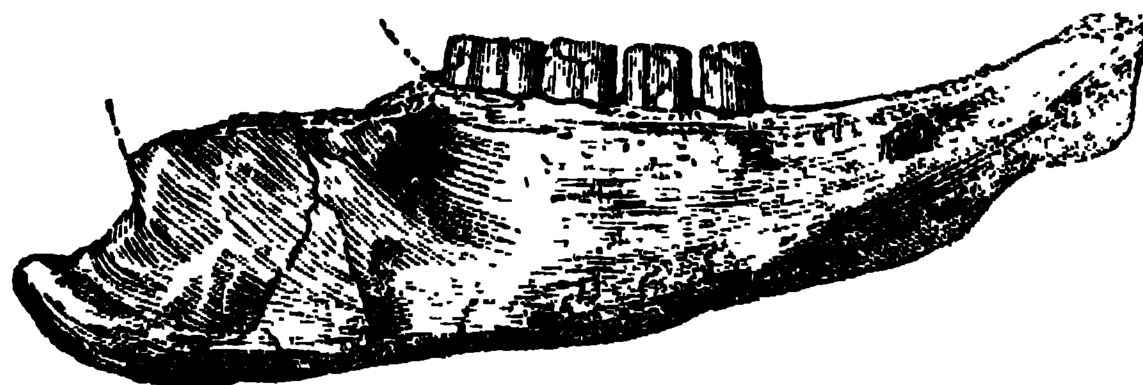
A genus of Edentate Megatherioids, founded on some fossil remains described by Dr. Harlan in his 'Medical and Physical Researches,' and referred by him to *Megalonyx*, and on a mutilated lower jaw and teeth discovered by Mr. Darwin among the many interesting novelties which have been the result of that zealous naturalist's researches in the southern division of America.

The fossil last alluded to was found in a bed of partly consolidated gravel at the base of the cliff called Punta Alta, at Bahia Blanca, in Northern Patagonia, and consists of the lower jaw, with the series of teeth entire on both sides: the extremity of the symphysis, the coronoid and condyloid processes, and the angular process of the left ramus, are wanting.

The teeth are implanted in very deep sockets, and about one sixth only of the last molar projects above the alveolus; but the proportion of the exposed part increases gradually in the anterior teeth. This and the relative distance of the teeth will be seen in the following figure.

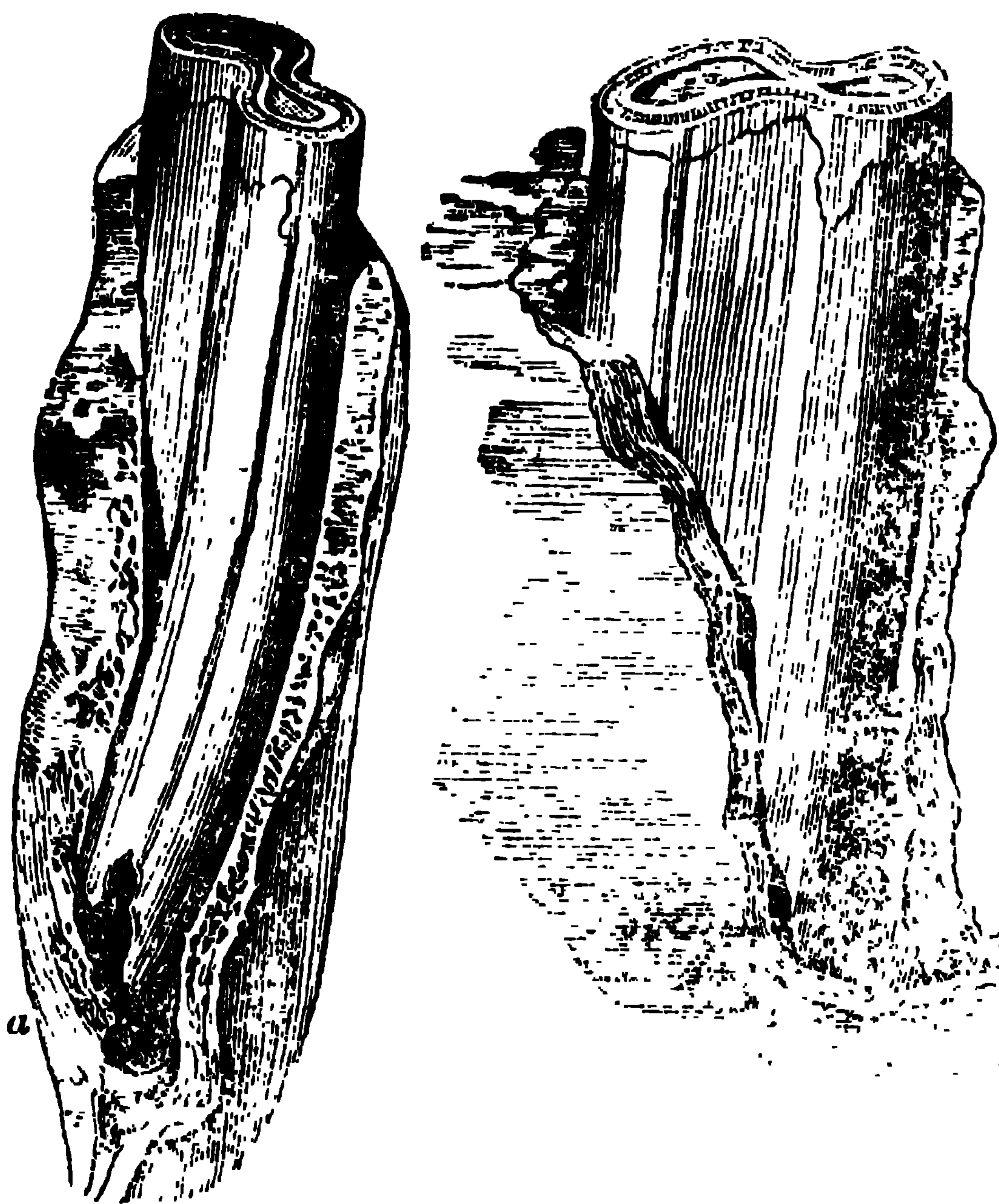


Lower jaw of Mylodon, one-sixth nat size. (Owen.)



External view of right ramus of lower jaw of Mylodon (profile), one-sixth nat. size.

The implanted part of each tooth is simple, of the same size and form as the projecting crown, and with a large conical cavity at the base, for the persistent pulp, and indicating that their growth, during life, was perpetual



Teeth of Mylodon, showing the depth of their implantation. The cavity at the base of the tooth is seen in figure *a*. Two-thirds nat. size. (Owen.)

Professor Owen remarks that these teeth are composed, as in *Bradypus*, *Megatherium*, and *Megalonyx*, of a central pillar of coarse ivory, immediately invested with a thin layer of fine and dense ivory, and the whole surrounded by a thick coating of cement.

The exterior surface of the symphysis of the jaw (which is completely anchylosed) is characterised by two oval mammilloid processes, situated on each side of the middle line, and about half-way between the anterior and posterior extremes of the symphysis. Nearly four inches behind the anterior extremity of the above process is the large anterior opening of the dental canal, which is five lines in diameter, and situated about one-third of the depth of the ramus of the jaw from the upper margin. The Professor observes that the magnitude of this foramen, which gives passage to the nerve and artery of the lower lip, indicates that this part was of large size: and that the two symphyseal processes, which probably were subservient to the attachment of large retractor muscles, denote that the motions of such

a lip were free and extensive. The angle of the jaw is produced backwards, and ends in an obtuse point, slightly bent upwards; a foramen, one-third less than the anterior one, leads from near the commencement of the dental canal to the outer surface of the jaw, a little below and behind the last molar tooth; and this foramen presents the same size and relative position on both sides of the jaw. Mr. Owen finds no indication of a corresponding foramen, or of symphyseal processes in the figures or descriptions of the lower jaw of the Megatherium, nor in that of the Sloths, Ant-eaters, Armadillos, or Manises, which he had examined with a view to this comparison.

Mr. Owen further observes that in the *Megatherium* the inferior contour of the lower jaw is peculiarly remarkable, as Cuvier has observed, for the convex prominence or enlargement which is developed downwards from its middle part; but in the *Mylodon* the corresponding convexity is slight, not exceeding that which may be observed at the corresponding part of the lower jaw of the Ai or the Orycteropus; and after entering into further interesting details, the Professor comes to the conclusion that the lower jaw of the *Mylodon* is very different from that of the *Megatherium:* with that of *Megalonyx* he had of course no means of comparing it.

'Among existing *Edentata*,' continues the Professor, 'the *Mylodon*, in the form of the posterior part and angle of the jaw, holds an intermediate place between the Ai and the great Armadillo: in the form of the anchylosed symphysis of the lower jaw it resembles most closely the Unau, or two-toed Sloth; but in the peculiar external configuration of the symphysis, resulting from the mamilloid processes above described, the *Mylodon* presents a character which has not hitherto been observed in any other species of *Bruta*, either recent or fossil.'

Two species, *Mylodon Harlani*, founded on the fossil described by Dr. Harlan, and *Mylodon Darwinii*, on that discovered by Mr. Darwin, are recorded by Professor Owen; and he gives the following admeasurements of the lower jaw of the latter species:—

	Inches.	Lines.
Length (as far as complete) . .	17	6
Extreme width, from the outside of one ramus to that of the other . .	9	0
Depth of each ramus . . .	4	9
Length of alveolar series . .	4	8
From first molar to broken end of symphysis	6	0
Breadth of symphysis . . .	3	7
Longitudinal extent of symphysis .	4	6
Circumference of narrowest part of each ramus	5	9

He further observes that the teeth and bones of *Mylodon Darwinii*, above described, exhibit all the appearances and conditions of those of a full-grown animal, and that they present a marked difference of size as compared with those of *Mylodon Harlani*, which must have been a much larger animal, for if the lower jaw of the latter species bears the same proportion to its teeth as that of *Mylodon Darwinii* does, it must be about two feet in length. (*Zoology of H. M. S. Beagle.*)

Scelidotherium. (Owen.)

A large extinct edentate mammal, allied to *Megatherium* and *Orycteropus*.

The remains on which this genus is founded include the cranium, which is nearly entire, with the teeth, and part of the *os hyoides;* the seven cervical vertebræ, eight dorsal and five sacral vertebræ, both scapulæ, the left humerus, radius and ulna, two carpal bones, and an ungueal phalanx; the two femora, the proximal extremities of the left tibia and fibula, and the left astragalus.

These bones were discovered by Mr. Darwin at Punta Alta in Northern Patagonia, and in the same bed of partly consolidated gravel as that wherein the lower jaws of *Toxodon* and *Mylodon* were imbedded. All the parts were discovered in their natural relative position, indicating, as Mr. Darwin observes, that the sublittoral formation in which they had been originally deposited had been but little disturbed. This beach is covered at spring-tides, and many portions of the skeleton were encrusted with *Flustræ:* small marine shells were lodged within the crevices of the bones.

Sufficient of the cranium remains to indicate that its general form resembled an elongated, slender, subcompressed cone, beginning behind by a flattened vertical base which expanded slightly to the zygomatic region, and thence contracted gradually in all its dimensions to the anterior extremity.



Remains of skull of Scelidotherium. (Owen.) Reduced.

'The Cape Ant-eater (*Orycteropus*)' [Aard-vark], says Professor Owen, 'of all *Edentata*, most nearly resembles the present fossil in the form of its cranium, and next in this comparison the great Armadillo (*Dasypus Gigas*, Cuv.) may be cited: on the supposition therefore that the correspondence with the above existing Edentals observable in the parts of the fossil cranium which do exist, was carried out through those which are defective, the length of skull of the Scelidothere must have been not less than two feet. The cranium is singularly small and slender in proportion to the rest of the skeleton, especially the bulky pelvis and femur, of which bones the latter has a length of seventeen inches, and a breadth of not less than nine inches: the astragalus again exceeds in bulk that of the largest Hippopotamus or Rhinoceros; yet the condition of the epiphyseal extremities of the long bones proves the present fossils to have belonged to an immature animal. Hence, although the Scelidothere, like most other Edentals, was of low stature, and, like the Megatherium, presented a disproportionate development of the hinder parts, it is probable that, bulk for bulk, it equalled, when alive, the largest existing pachyderms not proboscidean. There is no evidence that it possessed a tessellated osseous coat of mail.'

Professor Owen gives a most minute and interesting description of the various parts of the cranium, for which we refer to his memoir, remarking only that the most interesting features in the region of the temporal bone consist in the fine condition of the tympanic bones, and the presence of a semicircular pit, immediately behind the tympanic bone, for the articulation of the styloid element of the hyoid or tongue bone.

'In these points,' observes the Professor, 'we trace a most remarkable correspondence with the Glossothere, and in the separate tympanic bone the same affinity to the Orycteropus as has been already noticed in the more bulky extinct Edental. This correspondence naturally leads to a speculation as to the probable generic relationship between the Glossothere and Scelidothere: now it may first be remarked that the styloid articular depression is relatively much larger and much deeper in the Glossothere than in the Scelidothere: in the former its diameter equals, as we have seen, one inch; in the Scelidothere it measures only a third of an inch, the whole cranium being about two-fifths smaller. If we turn next to the anterior condyloid foramina, which in the Scelidothere are double on each side, we obtain from them evidence that the muscular nerve of the tongue could only have been one-third the size of that of the Glossothere. These proofs of the superior relative development of the tongue in the Glossothere indicate a difference of habits, and a modification probably of the structure of the locomotive extremities; and when we associate these deviations from the Scelidothere with the known difference in the position of the occipital plane, which in the Glossothere corresponds with that in the *Myrmecophaga* and *Bradypus*, we shall be justified in continuing to regard them, until evidence to the contrary be obtained, as belonging to distinct genera.'

The bones of the cranium connected with the organ of hearing and an accidental fracture of the right os petrosum, demonstrating its usual dense and brittle texture, and at the same time exposing the cochlea with part of its delicate and beautiful lamina spiralis, give Professor Owen occasion to observe that the conservation of parts of the organs of vision in certain fossils has given rise to arguments which prove that the laws of light were the same at remote epochs of the earth's history as now; whilst the structures just

alluded to demonstrate, in like manner, that the laws of acoustics have not changed, and that the extinct giants of a former race of quadrupeds were endowed with the same exquisite mechanism for appreciating the vibrations of sound as their existing congeners enjoy at the present day.

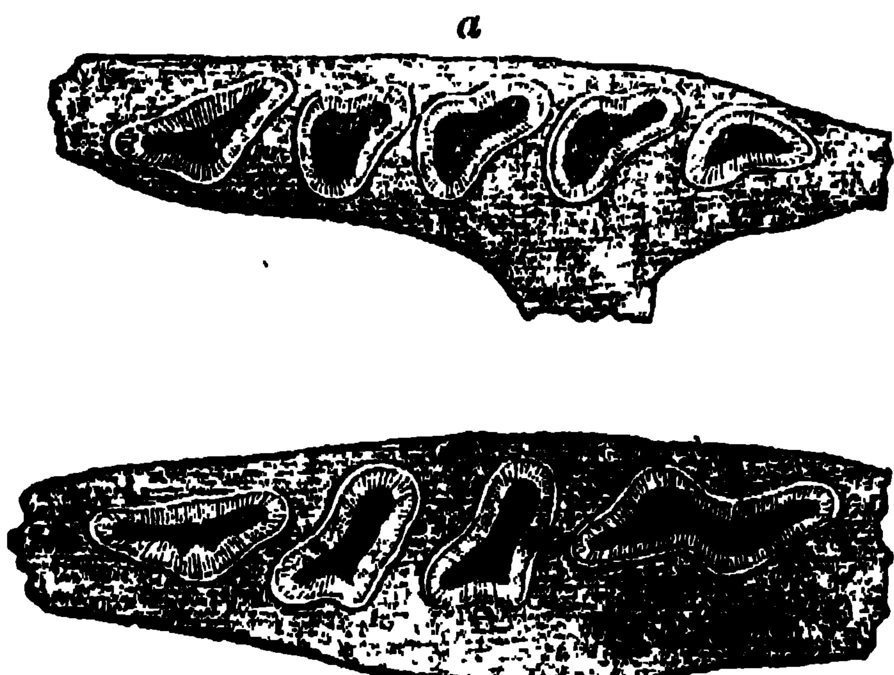
'The brain,' says Mr. Owen, 'being regulated in its development by laws analogous to those which govern the early perfection of the organ of hearing, appears to have been relatively larger in the Scelidothere than in the Glossothere: it was certainly relatively longer; the fractured cranium gives us six inches of the antero-posterior diameter of the brain, but the analogy of the Oryeterope would lead to the inference that it extended further into the part which is broken away. The greatest transverse diameter of the cranial cavity is four inches eight lines; their dimensions however are sufficient to show that the brain was of very small relative size in the Scelidothere; and, both in this respect and in the relative position of its principal masses, the brain of the extinct Edental closely accords with the general character of this organ in the existing species of the same order. We perceive by the obtuse ridge continued obliquely upwards from above the upper edge of the petrous bone, that the cerebellum has been situated wholly behind the cerebrum; we learn also, from the same structure of the enduring parts, that these perishable masses were not divided, as in the Manis, by a bony septum, but by a membranous tentorium, as in the Glossothere and Armadillos: in the Orycteropus, as has been before remarked, there is a strong, sharp, bony ridge extending into each side of the tentorium. The vertical diameter of the cerebellum and medulla oblongata equals that of the cerebrum, and is two inches three lines: the transverse diameter of the cerebellum was about three inches nine lines; its antero-posterior extent about one inch and a half. The sculpturing of the internal surface of the cranial cavity bespeaks the high vascularity of the soft parts which it contained, and there are evident indications that the upper and lateral surfaces of the brain had been disposed in a few simple parallel longitudinal convolutions. The two anterior condyloid foramina have the same relative position as the single corresponding foramen in the Glossothere, Orycterope, and Armadillos; and the inner surface of the skull slopes outwards from these foramina to the inner margin of the occipital condyle.'

The size of the orbit is relatively smaller than in the Orycterope, and still less than in the Ant-eaters. 'Here however,' observes Mr. Owen, 'we have merely an exemplification of the general law which regulates the relative size of the eye to the body in the Mammalia. The malar bone does not extend so far forwards in front of the orbit as in either the Orycterope or Armadillo; in the inclination however with which the sides of the face converge forwards from the orbits, the Scelidothere holds an intermediate place between the Armadillos and Orycterope.'

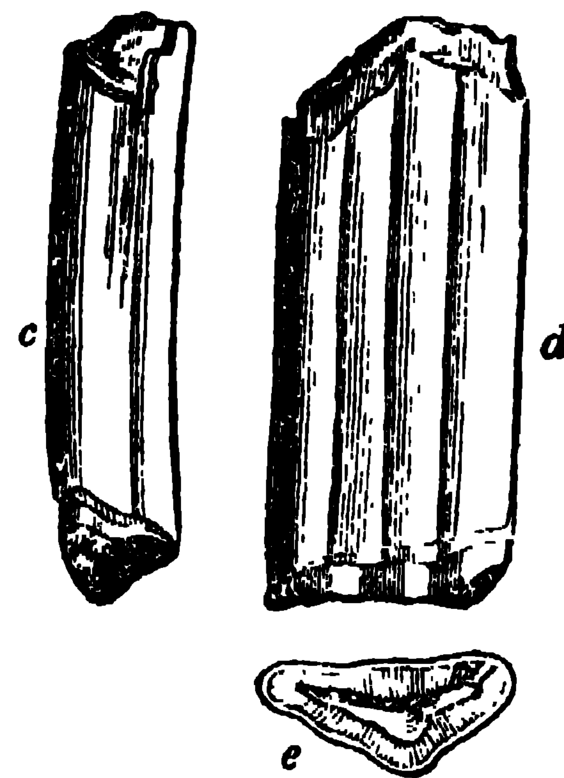
The dental formula of Scelidotherium appears to have been:—

$$\text{Incisors } \frac{0}{0}; \text{ Canines } \frac{0}{0}; \text{ Molars } \frac{5-5}{4-4} = 18.$$

Though the teeth of *Mylodon* and *Scelidotherium* have a close analogy to those of existing small Insectivorous Edentals, there is nothing in their structure to militate against the presumption that these extinct genera were fed on succulent plants, such as cabbage-palms, or on farinaceous vegetables, such as large ferns. Their teeth are well adapted to chew vegetable tissues of moderate firmness. (*Zoology of H. M. S. Beagle.*)



One-half nat. size.



Dentition of Scelidotherium.

a, Teeth of upper jaw in situ, seen from above; *b*, teeth of lower jaw in situ, same view; *c*, *d*, teeth, showing the depth of their implantation in the jaw and their structure; *e*, crown of tooth, seen from above. (Owen.) Reduced.

After the above was written, and indeed while the article was in the press, we received the *Comptes Rendus* (April, 1839), in which appears an extract of a letter from M. Lund to M. Victor Audouin, dated the 5th of November, 1838, giving an account of the discovery by M. Lund of numerous fossil mammals in Brazil. The portion of the country examined by this zealous zoologist is comprised between the rivers Rio das Velhas, one of the confluents of the Rio de S. Francisco, and the Rio Paraopeba. This tract forms an elevated plateau of 2000 feet above the level of the sea, and is traversed in the midst by a mountain-chain only from 300 to 700 feet high. The chain is formed by a secondary limestone (calcaire secondaire) stratified horizontally and having all the characters of the *zechstein* and the *hohlen-kalkstein* of the Germans (*calcaire à cavernes*). It is entirely riddled with caverns and traversed in all directions by fissures, the interior of which is more or less filled with a red earth identical with the red earth which forms the superficial bed of the country. In this basin of the Rio das Velhas, M. Lund has discovered in company with the remains of *Feræ*, *Glires*, *Pachydermata*, *Ruminantia*, *Marsupialia*, *Cheiroptera*, and *Simiæ*, the following mammiferous fossils, which seem to claim attention here.

'Family of Edentata.

'A *Myrmecophaga* of the size of an ox (*Myrmecophaga gigantea*).

'Family of Effodientia.

'1. Two species of *Dasypus*; one allied to *D. octocinctus*, and the other twice as large as the living species.

'2. *Xenurus*. 3. *Euryodon*, a lost genus of *Tatou*, or Armadillo. 4. *Heterodon**, distinguished from all the living armadillos by the proportion of its teeth. 5. *Chlamydotherium*, a new genus of armadillo, representing on a great scale the genus *Euphractus* of Wagler (the *Encoubert* of Buffon); two species, one of the size of a tapir, the other larger than a rhinoceros.

'6. *Hoplophorus*. A very extraordinary genus, whether we consider the massive proportions of the species, their gigantic stature, or the singular combination of different types of organization manifested in them. Their characters nevertheless approach more and more to the family of sloths.

'These singular animals were armed with a cuirass which covered all the upper parts of their body, and was composed of small hexagonal scutcheons, except on the middle of the body, where the scutcheons put on a square form and were arranged in immoveable transverse bands. The bones of the trunk as well as the large bones of the extremities are very similar to those of the Armadillos (Tatous) and especially to those of the *Cachicames* [ARMADILLO, vol. ii., p. 352]; but the bones of the feet are so abridged and the articular surfaces present such a considerable flattening, that nothing similar is to be seen in any animal skeleton, and one cannot conceive how such feet could serve for digging in the earth (creuser la terre): the form of the teeth, too, indicates that these singular animals could only have been nourished with vegetable substances, and we must suppose that they fed after the manner of the great *Pachydermata*. However this may be, the *Hoplophori*, of which

* This name is preoccupied. See the title.

M. Lund distinguishes two species, present this particularity, that their zygomatic arch is furnished with a descending branch, a character regarded till now as exclusively proper to the Sloths. These two species were each of the size of an ox. Fragments of these skeletons have already been described by MM. Weiss and D'Alton of Berlin.

'M. Lund has found fragments belonging to a genus approaching *Hoplophorus*, and to which he assigns the name of *Pachytherium*. Its proportions were still more massive and its stature taller.

'Family of Bradypoda.

'M. Lund is thus conducted to the family of the Sloths, which, "at the Antediluvian epoch," played in these countries a very important part, whether the number and variety of their forms, or the great size which the species attained, are considered.

'The first genus which he notices is *Megalonyx*. It is connected with the Armadillos (Tatous) by the osseous plates which protected a part of its body; but these plates, although of excessive size, far from forming a continuous cuirass as in the Tatous, were separated from each other by great intervals. The *Megalonyx* exhibits the greatest affinity to *Megatherium*, principally in the structure and composition of the feet, but those of the posterior limbs present the same torsion as the feet of *Bradypus tridactylus*, although proceeding from a different cause. In the Ai this torsion is produced by the particular mode of the articulation of the leg with the astragalus; in the *Megalonyx*, according to M. Lund, the articulation is effected in the ordinary manner, and it is the carpal surface of this last bone which, by its anomalous conformation, caused the contorsion of all the rest of the foot.

'The molars, to the number of five above and four below, are deprived of roots as in the animals of the order *Edentata;* in that they differ from those of *Megatherium*, which are described as having two roots.*

'The Megalonyxes were provided with a tail, which was excessively strong and probably prehensile, and this, joined to the contorsion of the hind feet and the enormous size of their claws, leads to the belief, says M. Lund, that these animals, notwithstanding the enormous weight of their body, were destined to climb, like their analogues in the present creation.

'This genus appears to have been very rich in species. M. Lund already distinguishes five; one of which, *M. Cuvieri*, was of the stature of a very stout ox; and this was not the largest species.

'By the Megalonyxes, a new genus (*Sphenodon*), which was of the size of a hog, finds its place.

'Still nearer to the Sloths must be arranged a new genus which M. Lund designates under the name of *Colodon*, and which consists of one species.

'Returning to the consideration of the animals which he enumerates, and which are comprised in the order *Bruta* or *Edentata* of Cuvier, M. Lund observes,—

'1. That the family of Ant-eaters properly so called, that of the Tatous, and that of the Sloths, which, at the present epoch, are peculiar to America, were also found at the preceding epoch.

'2. That then, these same families were exclusively proper to this part of the world, as they are at the present epoch; and that this gives cause for thinking that no species of these three families has hitherto been found in the diluvial beds of the other parts of the world.

'3. That this great order of the *Edentata* was then more numerous both in genus and species than it now is.

'4. That the greater part of these mammiferous genera which once peopled the country have disappeared.

'5. That every species has been destroyed, two species only exhibiting affinity, but not perfect identity, with the living species.

'6. Finally, that the animals of this order attained at that epoch dimensions much greater than those which they now present.

'The family of the Sloths has now entirely disappeared in the basin of the Rio das Velhas, which is explained by the want of virgin forests, all this country being occupied by the form of vegetation called by the Brazilians *Campos*. It is probable that at the epoch when these great animals lived it was otherwise, and that the country was then covered by immense forests. Everything leads to the belief that they led the same kind of life as their analogues of the present creation, that is to say, that notwithstanding the colossal proportions of their bodies, they sought their nourishment on trees.'

Such is the extract from the letter of M. Lund relating to the subject of the present article. The zoologist will look with anxiety for more detailed descriptions, which will enable him to ascertain which of the animals mentioned by M. Lund are identical with those noticed above, and give him a further insight into the species detected by this magnificent discovery. *Hoplophorus*, we presume, is the *Glyptodon* of Owen. The gigantic *Myrmecophaga* is probably the *Glossotherium* of the same author.

* But see above, pp. 67, 69.

MEGATRE'MA, Dr. Leach's name for those species of *Pyrgoma* which have a large aperture. [CIRRIPEDA, vol. vii., p. 209.]

MEIBOM, MARC, a member of a numerous German family, who were distinguished in the seventeenth century for their classical knowledge and scientific attainments. He was born at Tonningen, in the duchy of Schleswig, about the year 1630, and died at Utrecht about the year 1711. Dr. Hutton gives 1590 as the year of his birth, and 1668 as that of his death, which are no doubt incorrect. Marc Meibom was patronised by Christina, queen of Sweden, to whom he dedicated a collection of seven Greek authors upon music, Amster., 1652, 4to. He was subsequently appointed to a professorship in the university of Upsal, by Frederick III., to whom he acted in the capacity of librarian. He quitted Upsal for the professorship of belles-lettres in the academy of Amsterdam, where he remained but a short time. In 1674 he came to England, where he prepared the publication of a new edition of the Hebrew Bible, asserting that the edition then in use was full of errors; his pretensions appear however to have been ridiculed by the learned. Among his published works, a list of which will be found in the 'Biographie Universelle,' there is a curious 'Dialogue on Proportion,' wherein he introduces the whole of the antient geometricians, Euclid, Theon, Apollonius, &c. Many of the views advanced by Meibom in this work respecting the doctrine of proportion were shown to be erroneous by Langius, and by Dr. Wallis in a tract printed in the first volume of his works. (Hutton's *Dict.:* and *Biograph. Univer.*)

MEIGLYPTES. [WOODPECKERS.]

MEINAN, River. [SIAM.]

MEININGEN, or MEINUNGEN, the capital of the duchy of Saxe-Meiningen-Hildburghausen, is situated in 50° 35′ N. lat. and 10° 24′ E. long., in a pleasant valley on the banks of the river Werra, which here divides into several arms. It is a well-built town, with broad, straight, and paved streets; the ducal palace, called the Elisabethenburg, is a handsome building; the centre part is 500 feet in length, and it has two wings. It contains a library of 25,000 volumes, a gallery of paintings, a collection of engravings, and the archives of Henneberg. In a separate building in the garden there is a cabinet of medals and a collection of natural history. The other principal buildings are the house of the assembly of the Estates, the town-hall, with a good library, the four churches, an infirmary, and a theatre. There are a lyceum, a gymnasium, a seminary for country schoolmasters, and several schools. The environs are very agreeable. The inhabitants, now 6000 in number, have manufactures of black crape, yarn, calico, and woollens of various descriptions, in which they carry on a considerable trade.

MEISSEN, one of the circles of the kingdom of Saxony, is a part of the antient Margraviate of the same name. It lies on both sides of the Elbe, between 50° 42′ and 51° 26′ N. lat., and 12° 45′ and 14° 17′ E. long. Its area is 2355 square miles, and its population 379,378 souls. This circle is one of the most fertile and best cultivated parts of the kingdom: it produces corn, fruit, flax, hemp, tobacco, hops, and in some parts wine. It likewise contains the principal manufactories in Saxony of woollen, linen, and cotton. Dresden, the capital of the kingdom, is in this circle, which is peculiarly distinguished by its natural beauties, such as the mountainous country known by the name of the Saxon Switzerland, the basaltic groups of Stolpen, and the romantic environs of Dresden, Pillnitz, and Meissen. [DRESDEN.]

MEISSEN, the second town in the circle of the same name in the kingdom of Saxony, is situated in 51° 10′ N. lat. and 13° 25′ E. long., on the little river Meise or Misi, on and between hills on the left bank of the Elbe, over which there

is a covered bridge, supposed to have been originally built in the eleventh century; this bridge was destroyed in 1547, 1757, and in 1813, but has since been rebuilt. Meissen is one of the oldest towns in the country, having been founded in 922 (as some say, 928), by King Henry I., as a bulwark of his German settlements against the conquered Slavonians. His son, Otho I., founded the cathedral, and established a bishopric, of which the town continued to be the seat till the Reformation. There are now but few remains of the fortifications which were begun by Henry I. The cathedral, a masterpiece of antient German architecture, has a tower surmounted with a spire 60 feet high, composed of beautiful open work. It is rich in antient monuments. Adjoining it is the princes' chapel, founded in 1425, by Frederick the First, elector of Saxony, of the house of Meissen, for the hereditary vault of his family, in which there is a bronze monument of the founder. The palace of Albrechtsburg, near the cathedral, was formerly the common residence of the margraves, burgraves, and bishops of Meissen; but the margraves transferred their residence to Dresden in the thirteenth century. The palace was almost entirely rebuilt in 1471. Ever since 1710 it has contained the celebrated porcelain manufactory, the productions of which rival or surpass those of China and Japan in hardness, durability, the beauty of the forms, and the taste of the painting. The former convent of St. Afra, on a lofty rock, which is joined by a stone bridge to the eminence on which the palace stands, contains the prince's school, in which there are 120 scholars, most of whom live free of all expense. There are various flourishing manufactures, but the chief source of profit is the making of wine. (Reinhard, *Die Stadt Meissen*, &c; Ursinus, *Die Domkirche zu Meissen*.)

MEISSNER, AUGUSTUS GOTTLIEB, a popular and voluminous German writer of the last century, was born at Bauzen in Upper Silesia, November 4, 1753. In 1785 he was appointed professor of æsthetics and classical literature at the university of Prague, and in 1805 director of the high school at Fulda, where he died, February 20, 1807. He wrote several dramatic pieces, including some translations from Molière and Destouches; also an abridgement in German of Hume's 'England': but it is his 'Skizzen' that rendered him a favourite with the public. These sketches, extending to fourteen *sammlungen*, or series (the first of which appeared in 1778, the last in 1793), consist of essays, tales, narratives, anecdotes, dialogues, &c.; and recommend themselves by their agreeable liveliness, shrewdness, and pleasantry. Although not entirely free from blemishes of style, they have the merit of being the most successful attempts in the lighter walks of literature which Germany could then produce. Many of these pieces were translated or imitated in French, Danish, and Dutch, and one or two were translated by Thompson in his 'German Miscellany.'

His 'Tales and Dialogues' (1781-9) may be considered as a continuation of his sketches, being similar in plan. His 'Alcibiades,' 'Massaniello,' 'Bianca Capello,' and 'Spartacus,' are productions of greater length (the first mentioned being in four volumes), and are specimens of the historical and biographical romance. With the exception of the last, they have all been translated into French. Besides the above and a variety of other works, Meissner contributed a great number of literary and historical articles to different periodicals.

MEISTERSINGERS. [GERMANY—*Language and Literature*.]

MEKINEZ. [MAROCCO.]

MEJERDA, or BA'GRADAS, is a river in Northern Africa, and probably the largest river of that continent which falls into the Mediterranean, except the Nile. Its upper course lies within the territories of Algiers; in its middle course it forms the boundary-line between that country and Tunis, and in its lower course it traverses the northern district of the last-mentioned state. A great number of rivers rise in the mountains which between 35° and 36° N. lat. and 7° and 8° E. long. constitute the most eastern of the elevated ranges of Mount Atlas: after watering a rich and populous country, which extends east of those ranges, they unite about 35° 30′ N. lat., and form the Wady Serat, the principal branch of the Mejerda river. In its course, which is nearly due north, it separates Algiers from Tunis, until it reaches 36° 10′ N. lat., where it is joined by the Wady Hamiz from the west, and takes the name of Mejerda. Up to this junction its course exceeds 100 miles, and from this point it runs about 60 miles eastward through a hilly country. It then turns north-north-east, and continues this course until it falls into an inlet of the bay of Tunis near Cape Farina, after a course of more than 260 miles. The Mejerda does not appear to be navigated, but it is used to irrigate the fields in the lower part of its course, where it flows through a wide and level valley. It overflows and fertilises the adjacent country; but these inundations do not, as in the Nile, take place in the middle of summer, but in the spring. They are the effect of the winter and spring rains, and of the melting of snow on the high mountains which surround its upper branches.

MEKRAN. [PERSIA.]

MELA, POMPO'NIUS, a Roman writer on geography. He is thought by some critics to have been the same person as the Annæus Mella, or Mela, who was implicated in a conspiracy against Nero, and who put an end to his own life (Tac., *Ann.*, xvi. 17; Plin., *H. N.*, xix. 6); but this opinion is only founded on the similarity of the names. It is probable, from a passage in which Mela speaks of the recent conquest of Britain (iii. 6), that he was contemporary with the emperor Claudius; and it is evident from many passages in his work that he could not have lived before the time of Augustus (iii. 1, 'turris Augusti titulo memorabilis;' compare iii. 2, &c.). It appears from a passage in his own work (ii. 6) that he was born at Tingitera in Spain; but the MSS. differ so widely in this passage, that it is difficult to determine the right reading: many critics think that we ought to read Mellaria.

Mela's work is entitled in most MSS. 'De Situ Orbis.' It is divided into three books, and contains a very brief description of the various parts of the world. In the first book, after giving a short account of the great divisions of the earth, Mela commences with Mauritania (part of Marocco), and following generally the coast, he describes successively Numidia, the province of Africa, Cyrenaica, Egypt, Arabia, Syria, Phœnicia, Cilicia, Pamphylia, Lycia, Caria, Ionia, Æolis, Paphlagonia, and the countries on the Euxine and the Mæotis as far as the Rhiphæan mountains. In the second book he commences at the river Tanais (Don), and gives an account of the countries in Europe on the western side of the Mæotis and the Euxine as far as Thrace. He then proceeds to describe Greece, Italy, Gallia Narbonensis, and the coast of Spain as far as the Straits of Gibraltar, from which he commenced his description in the first book. The remainder of the second book is occupied with an account of the islands in the Mediterranean, Adriatic, Ægean Sea, &c. In the third book he commences again at the Straits of Gibraltar, and follows the western coast of Spain till he reaches Gaul; he then gives an account of the western coast of Gaul, and afterwards describes Germany and the central parts of Europe and Asia as far as the Caspian. After mentioning some of the islands in the ocean, he next describes India and the maritime coast of Carmania, Persia, and Arabia, and concludes with a description of the central parts of Africa.

Mela appears to have been a mere compiler, and to have had no scientific knowledge of his subject. If we consider him later than Strabo, it does not appear from Mela's work that geography had made any progress in the meantime. Like Strabo, he considers the earth as penetrated by four great inlets of the ocean, of which the Mediterranean, the Red Sea, and the Persian Gulf were three: the fourth was the Caspian Sea. The singular error as to the Caspian is the more remarkable when contrasted with the fact that Herodotus knew the Caspian to be a lake. (Herod., i. 203; Strabo, p. 121; Mela, i. 1; iii. 6.)

The best editions of Mela are by Gronovius, Leyden, 1685, frequently reprinted; by Tzschucke, 7 vols. 8vo., Leip., 1807; and the Bipont, 1809. Mela has been translated into English, by Arthur Golding, Lond., 1585 and 1590; into Italian, by Porcacchi, Ven., 1557; and into French, by Fradin, 3 vols. 8vo., Paris, 1804.

MELAIN, a name which has been given to the colouring matter of the ink of the cuttle-fish. It is obtained pure by evaporating the ink to dryness and boiling the residue successively in water, alcohol, hydrochloric acid, more water, and a little carbonate of ammonia. Dr. Prout found 100 parts of the dry residue of the ink of the cuttle-fish to be composed of—Melain, 78·; carbonate of lime, 10·40; carbonate of magnesia, 7·; substance analogous to mucus, 0·84: various salts, 2·16.

MELALEUCA CAJEPUTI (Roxb.), the *Melaleuca*

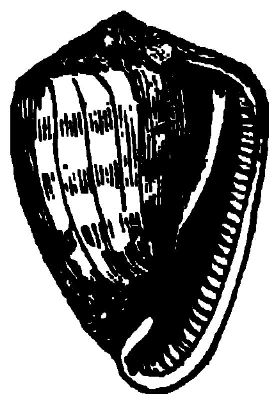
Minor (Smith), a native of the Molucca islands, yields the oil termed cajeput. It is obtained by distillation of the leaves and branches, which are collected the night before they are subjected to this process. It is very limpid, pellucid, and of a light or yellowish green colour. Specific gravity, 0·927; it boils at 140° (Réaumur). It is possessed of a penetrating odour; the taste is acridly aromatic, leaving a sense of coldness in the mouth. Its chemical composition is, carbon 78·12, hydrogen 11·49, oxygen 10·38. It seems to consist of two distinct oils: one transparent as water, of specific gravity 0·897; the second dark green, of specific gravity 0·920. Unrectified oil reddens litmus paper, but rectified does not. It does not detonate with iodine, nor does it form an artificial camphor with hydrochloric acid gas, but has its colour much changed by that gas. It never deposits a stearopten. Some samples of cajeput oil contain copper, which may be detected by different tests; an artificial oil is also sometimes vended, but it is not difficult to detect the fraud.

In its action on the human frame cajeput participates in the properties of other volatile oils, and is rubefacient externally, stimulant and antispasmodic when taken internally. Mixed with other ingredients it has proved a useful application to the joints in rheumatism and similar affections, while a few drops of it have often relieved or warded off slight attacks of hysteria or epilepsy. It by no means realised the expectations entertained of it as a remedy in spasmodic cholera.

MELA'MPUS (Zoology), De Montfort's name for a genus of turbinated *testacea* (*Conovula* or *Conovulus* of Lamarck) placed by Cuvier next to the great genus *Auricula*, and by M. de Blainville and M. Rang under the family *Auriculacea*. De Blainville arranges both *Melampus* (Conovula) and *Tornatella* under *Pedipes* (Adanson).

This genus has, like the *Auriculæ*, plaits on the columella or pillar of the shell, but the external lip has no roll or *bourrelet*, and is finely striated internally. The general contour of the shell is that of a cone, of which the spire forms the base.

Example, *Melampus coniformis*.



Melampus coniformis, a little enlarged.

MELANCHTHON, PHILIP, (or MELANTHON, as he himself was most accustomed to write the name, according to Christ. Saxius, 'Onomast.' iii. 589), was born in the small town of Bretten or Bretheim, in the Palatinate of the Rhine, or Lower Palatinate, as it used to be called, the dominion of the elector palatine. They still show at Bretten, or did a few years ago, the house in which his parents lived. His father was George Schwarzerde, or Schwarzerdt, and is called by Melchior Adam, the earliest authority, Magister Armorum, a description which has given rise to some controversy. It appears that whatever was the original condition of Melanchthon's father, he was a man of remarkable ingenuity in his profession, and had worked his way up to a situation of some distinction, that of principal engineer to the elector, before the birth of his son. (See Bayle, *Dict. Crit.*, 2nd edit., ii. 2089, and the authorities there quoted.) According to Joachim Camerarius (in *Vit. Ph. Melan.*) he was a native of Heidelberg, and came to take up his residence at Bretten upon marrying the daughter of John Reuterus, a person who had been mayor of that town. Reuterus, who lived till his grandson was eleven years old, has the credit of having been the chief superintendent of his earliest training. On the death of his grandfather, which was followed within a fortnight by that of his father, he was sent to the college of Pfortsheim, where the remarkable progress he had already made in his studies was continued at an answerable or an accelerated rate. (See a short notice of the early life of Melanchthon in Baillet's *Enfans Célèbres*, pp. 42, 43.)

At Pfortsheim he lodged in the house of a sister of the celebrated Greek scholar John Reuchlin, who was his relation, and it was from Reuchlin, who had translated his own Teutonic surname into the Greek formation Capnio, on the supposition of its connection with Rauch (smoke), that the young Schwarzerde, a compound, meaning, in English, 'black earth,' received the more melodious Grecised appellation of Melanchthon (quasi μέλαινα χθών), intended to signify the same thing; by which alone he is now known.

After spending about two years at Pfortsheim, Melanchthon was removed in 1509 to the university of Heidelberg, which however he quitted in 1512 for that of Tübingen, where he remained till, on the recommendation of his friend Reuchlin, he was in 1518 appointed, by the elector Frederic of Saxony, professor of Greek in the newly established university of Wittemberg. This situation he held so long as he lived.

It was at Wittemberg that Melanchthon became acquainted with Luther, then occupying the chair of theology in that university. In his young colleague the great reformer found, along with a ready disposition to imbibe his opinions in religion, a piety as sincere as his own, and an erudition greatly superior; while, if Melanchthon wanted the fiery energy and boldness, and the large heart of Luther, he was free also from some of the defects apt to attend upon such endowments of strength and passion, and, by the calmness, moderation, and gentleness of his whole nature, was formed both to temper the impetuosity of his friend, and to win admittance for their common views into minds of a certain class, and that by no means the lowest, which all the powers of the other might have assailed in vain.

Thus attached by the characteristics in which they were contrasted, as well as by those in which they resembled each other, they soon became the most intimate of associates and fellow-workers. After that of Luther, Melanchthon is the most distinguished name in the history of the Reformation in Germany; and the remainder of his biography is chiefly the detail of his various labours in the promotion of that great cause. In 1519 he accompanied Luther to Leipzig, to hold a disputation on the divine original of the papal authority with Eccius, or Eckius, one of the ablest of the Catholic champions of that age. For some years after this he was actively employed, not only in writing books in defence of the reformed doctrines, but in founding schools and colleges, in visiting churches, and in other services of the same kind, undertaken at the command of the elector.

In 1530 he was appointed by the general body of the reformers to draw up what was intended to be the conciliatory Confession, or exposition of their opinions, which was presented to the emperor at the diet held at Augsburg in March that year. Both Francis I. of France, and Henry VIII. of England, were desirous of obtaining the assistance of Melanchthon in their religious reforms, but circumstances interfered to prevent him from visiting either country. In 1540 and 1541 he maintained another great disputation with Eccius, which was begun at Worms, and afterwards transferred to Ratisbon, where it was carried on before the diet, the emperor presiding in person. After the death of Luther, Melanchthon became involved in a bitter controversy with the more ardent spirits of his party, in consequence of his aversion to extreme courses, and especially the timidity he was accused of showing in his approval of the system of compromise between the two religious issued by the emperor in 1548, and afterwards known by the name of the Interim, an approval in which, whether the circumstance is to be held honourable to him or the reverse, it must be admitted that he stood nearly alone among the distinguished men of both sides. He died at Wittemberg, 19th April, 1560, leaving two sons and two daughters by his wife, the daughter of a burgomaster of that town, whom he had married in 1520, and who died in 1557. His numerous works, consisting of theological treatises, commentaries on several of the Greek and Latin classics, Latin poems, and some historical and philosophical writings, were published in a collected form in five vols. fol., at Basle, in 1544, and in four vols. fol., at Wittemberg, in 1564, again in 1580, and again in 1601.

Melanchthon principally contributed to the diffusion of the Aristotelian philosophy in Germany, both by his teaching and his writings, among which were his 'Elements of Logic and Ethics.' [ARISTOTLE, p. 336.]

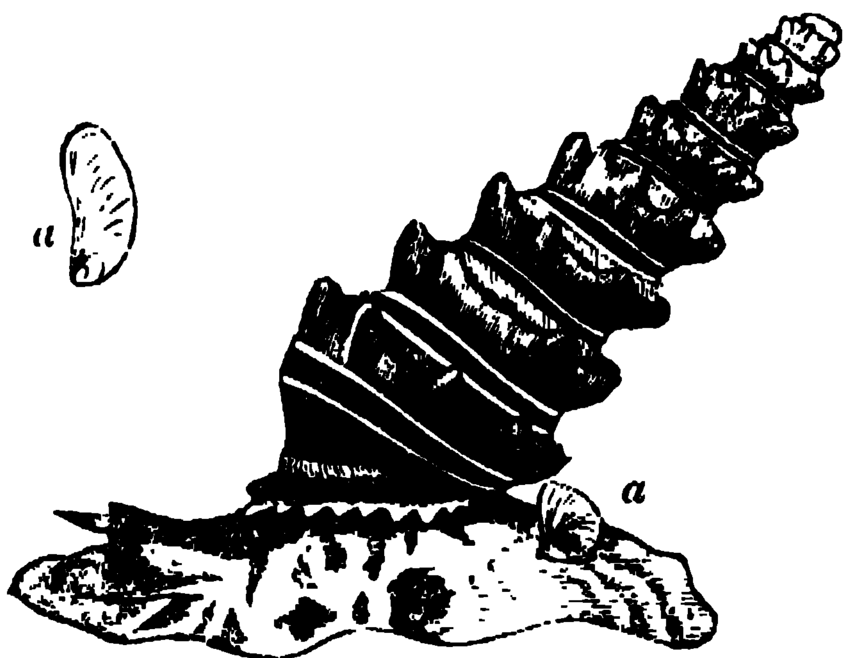
MELANERPES. [WOODPECKERS]

MELA'NIA, a genus of fluviatile, testaceous, opercu-

lated Gastropods, placed by Lamarck in his family *Melanians* [MELANIANS]; by M. de Blainville in his family *Ellipsostomata* [ELLIPSOSTOMATA]; by Cuvier in his order *Pectinibranchiata*, between the genera *Helicina* and *Rissoa;* and by M. Rang under the order last mentioned, and in the first family of it (*Turbinés* of De Férussac), between the subgenera *Paludina* and *Rissoa*.

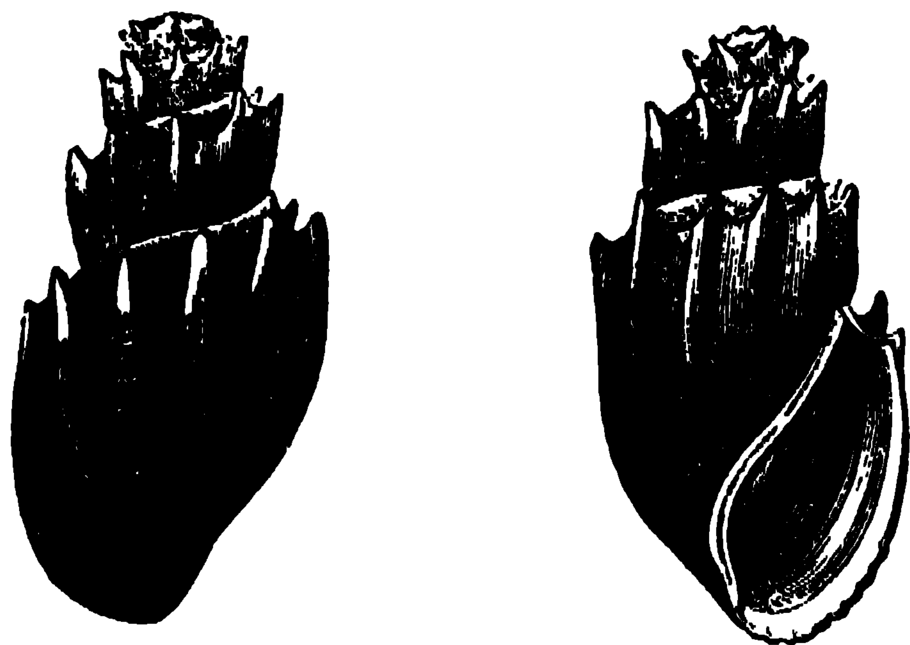
Generic Character.—Animal elongated, with a foot which is ordinarily short and not thick; head proboscidiform, subconical, truncated, and terminated by a buccal slit which is small and longitudinal; one pair of tentacles elongated, filiform, carrying the eyes on the external side, sometimes near the base, sometimes towards one-fourth of their length; mantle open, with festooned edges; *operculum* horny, elongated, and narrow, with an apicial and paucispiral summit. (Deshayes.)

Shell with an epidermis, of an oval oblong, a pointed spire, which is often elongated or turriculated, and an oval aperture which is widened anteriorly, and has a very sharp edge.



Animal and Shell of Melania (Pirena) aurita. *a*, Operculum.

Geographical Distribution of the Genus.—The rivers of warm climates generally, and of Asia especially. Species are also recorded from Africa and North and South America. Mr. Conrad has described several new species from the rivers of Alabama.



Melania amarula.



Melania subulata.

M. Deshayes thus divides the *Melaniæ* —

α.

Shell oval or subturriculated.
Example, *Melania amarula*

β.

Shell elongated, turriculated.
Example, *Melania truncata.*

γ.

Shell with the inferior angle detached.
Example, *Melania costellata.*

δ.

Shell with a bordered aperture.
Examples, *Melania marginata* and *Melania subulata*

Lamarck gives the rivers of the East Indies, Madagascar, the Isle of France, &c., as the locality of *Melania amarula*, the animal of which, he says, is very bitter, and passes for an excellent remedy for the dropsy.

The apex of all the species is generally eroded as the animal advances in age.

FOSSIL MELANIÆ.

M. Deshayes, in his Tables (Lyell, 1833), makes the number of living species thirty-four, and the number of fossil (tertiary) twenty-five. The species recorded as both living and fossil (tertiary) are, *Melaniæ inquinata, inflexa, Cambessedesii*, and a new species. The habitations allotted to the living species of *inquinata, inflexa, Cambessedesii*, and the new species, are, the Philippine Isles, the Mediterranean, and the lakes of Como and Geneva. *Melaniæ lactea, nitida*, and *costellata*, are noticed as fossil species found in more than one tertiary formation. In the last edition of Lamarck (1838) the number of recent species is thirty-six, and of these *M. inquinata* only is noted as occurring in a fossil state. The number of fossil species recorded in this edition is eight, and of these M. Deshayes notes the species *costellata, marginata*, and *nitida*, as not being *Melaniæ*, *M. nitida* having all the characters of the genus *Eulima*. The other two M. Deshayes keeps provisionally among the *Melaniæ*. *Melania semiplicata*, another of the eight, he conceives to be a variety of *M. lactea*, and is of opinion that it should be expunged from the catalogue.

Dr. Mantell records two species (*sulcata* and *costellata ?*) in the blue clay of Bracklesham. Professor Phillips notes a *Melania ?* in the Specton clay, and two species (*M. Heddingtonensis* and *M. striata*) in the coralline oolite, *M. Heddingtonensis* and *M. vittata* in the cornbrash, and *M. Heddingtonensis* and *M. striata* in the Bath oolite. In the table at the end of his work (*Geology of Yorkshire*) he records *Melaniæ striata* in the coralline and Bath oolite, *Heddingtonensis* in the coralline oolite, cornbrash, and inferior oolite, *lineata* in the inferior oolite, and *vittata* in the coralline oolite and cornbrash. Dr. Fitton records *Melania Heddingtonensis* in the Oxford oolite (Dorset and Oxford).

MELANIANS, Lamarck's name for a family of fluviatile, testaceous, operculated Mollusks, breathing water only, and belonging to the order *Trachelipoda*. The family consists of the genera *Melania, Melanopsis*, and *Pirena*, according to Lamarck, and Mr. G. B. Sowerby, Jun. (*Conchological Manual*) suggests that to these may be added *Anculosa* and *Pasithæa*. M. Deshayes, in the last edition of Lamarck, adds the genera *Eulima* and *Rissoa* to *Melania, Melanopsis*, and *Pirena*, the latter of which, it seems, should be expunged.

MELANOPSIS, a genus of fresh-water, testaceous, turbinated mollusks, to which Lamarck assigns a position among his family of *Melanians*. M. de Blainville places it in his family *Entomostomata*, between *Cerithium* and *Planaxis;* and M. Rang, who includes in it the genus *Pirena*, between *Scalaria* and *Planaxis*.

The genus *Melanopsis* was established by M. de Férussac, and much difference of opinion appears to have existed among zoologists as to its proper place in the series. M. Deshayes, in the last edition of Lamarck, gives it as his opinion that it should be arranged in the family of *Melanians*; and he observes that if one considers the zoological and conchological characters of the two genera *Melania* and *Melanopsis*, the conviction that they should be united soon arises. He remarks that M. de Férussac gave, in the first volume of the 'Memoirs of the Society of Natural History of Paris,' an interesting account of the animal of the *Melanopsides*, which he had observed in Spain in the neighbourhood of Seville and Valencia, and that M. Quoy has since made known the animal of *Pirena terebralis* of Lamarck; so that the means are now at hand for comparing with exactness the three principal types of the family of

Melanians, and of observing the analogy of their zoological characters.

If,' continues M. Deshayes, 'we have before us a great number of species of *Melaniæ* and *Melanopsides*, living and fossil, we remark a phenomenon entirely similar to that which we have pointed out with relation to the genera *Bulimus* and *Achatina;* that is to say, that we have seen the columellar truncation established by nearly insensible degrees from the most uncertain commencement to a notch as deep as that which marks the *Buccina*. If, in relying on the identity of the organization of the *Bulimi* and *Achatinæ*, we have been able to reduce almost to nothing the value of the character of the columellar truncation, we are authorised to employ here the same means for demonstrating the little importance which the truncation of the columella in the *Melanopsides* ought to have in the eyes of zoologists as a ground for separating them from the *Melaniæ*. Already we have explained ourselves as to the value of the genus *Pirena*, and have shown that it was composed by Lamarck from heterogeneous materials: on one side we find true *Melaniæ*, and on the other singular shells, approximating in their characters to certain *Cerithia* which Linnæus comprised among his *Strombi*. On approximating these species we soon find that they have all the principal characters of *Melanopsis*, and that they do not in reality differ from them, except by a notch in the right lip, which notch occupies in these species the place of the posterior gutter in the bucciniform *Melanopsides*. M. de Férussac clearly perceived the relation of these shells to the *Melanopsides*, and joined them to that group, leaving in the genus *Pirena* only those which we actually comprise among the *Melaniæ*. Thus dismembered, the genus *Pirena* should be expunged from the system.'

Geographical Distribution of the Genus.—M. Deshayes observes that the *Melanopsides* inhabit the fresh waters of the south of Europe, and particularly those in the neighbourhood of the Mediterranean; and that they show themselves abundantly in a fossil state in the greater part of the tertiary beds of Europe. He remarks that M. de Férussac has noticed that among the fossil species in our temperate countries there are some analogous to those which live in much warmer regions,—an interesting fact, from which he has been led to conclude that the lowering of the temperature had been a sufficient cause for the destruction of the races which once lived in the centre of France. M. Deshayes states that he had objected to M. de Férussac's drawing a conclusion so general from so confined a number of observations; and he thinks that, in order to establish a fact so important as that of change of temperature by the aid of observations on the mollusks, it would be necessary to find a great collection of facts, not only regarding the fresh-water mollusks, but also respecting those which inhabit the sea. He has, he says, collected these facts, and is thus able to estimate approximatively the temperature proper to each of the principal tertiary epochs.

Generic Character. — (*Melanopsis*, Fér., and *Pirena*, Lam.)—*Animal* with a proboscidiform muzzle and two contractile tentacula, which are conical, annulated, and each with an oculated peduncle at their external base; foot attached to the neck, very short, oval, angular on each side anteriorly; respiratory orifice in the gutter formed by the union of the mantle with the body. *Operculum* horny, subspiral.

Shell with an epidermis, elongated, fusiform or conico-cylindrical, with a pointed summit; spire consisting of from six to fifteen whorls, the last often forming two-thirds of the shell; aperture oval, oblong; columella twisted, solid, callous, truncated at its base, separated from the external border by a sinus, the callosity prolonging itself on the convexity of the penultimate whorl, forming a gutter backwards; sometimes a sinus at the posterior part of the right lip.

a.

A single sinus at the external border of the aperture, separating it from the columella. (Genus *Melanopsis*, Lam.)

Example, *Melanopsis præmorsa* (*Melanopsis lævigata*, Lam., *Melania buccinoidea*, Oliv., *Melanopsis buccinoidea*, Fér.).

β.

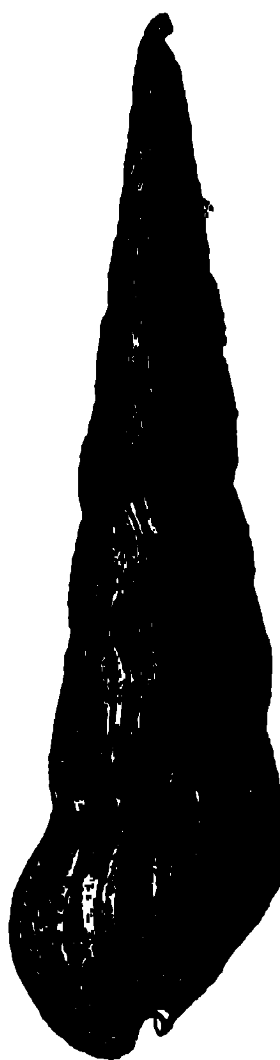
Two distinct sinuses at the external border of the aperture, one which separates it from the columella, the other situated near the union of this border with the penultimate whorl.




Melanopsis præmorsa.

Example, *Melanopsis atra* (*Pirena terebralis*, Lam., *Strombus ater*, Linn.).

Locality.—Madagascar.




Melanopsis atra.

FOSSIL MELANOPSIDES.

Mr. G. B. Sowerby, who also includes the genera *Melanopsis* and *Pirena* under the first generic appellation, says, 'We are not aware that any of the *Melanopsides* are marine, for all the recent species occur either in rivers or lakes, and yet most of the fossil species are found in beds that are considered by geologists (in this country) to be of marine formation. We know not what degree of credit is to be given to the assertion of a celebrated author, "that the greater number of the genera of the Pectinibranchia might formerly have contained species peculiar to rivers and lakes as well as to the sea," but this we do know, that wherever the fossil *Melanopsides* are found, they are accompanied by many other species of genera that at present only live in fresh water; and therefore we think they ought to be considered as characteristic of the formation in which they occur.'

M. Deshayes, in his Tables, makes the number of living species of *Melanopsis* ten, of fossil species (tertiary) eleven, and notes *Melanopsides buccinoidea* (præmorsa), *Dufourei*, *costata*, *nodosa*, *acicularis*, *incerta*, as species occurring both living and fossil (tertiary). He assigns as habitations to the latter, Asia, Spain, Greece, and Laybach. Of *Pirena* he makes the number of living species three, and of fossil (tertiary) two. In the last edition of Lamarck, M. Deshayes gives nine recent species, and of these he notices *Melanopsides costata*, *præmorsa*, *nodosa*, *Dufourei*, and *acicularis ?* (*M. subulatus*, Sow., 'Min. Con.'), as occurring in a fossil state, observing that it is to be presumed that the species found fossil at Dax is to be distinguished from *M. Dufourei*, which occurs in a fossil state in the Isle of Rhodes. The number of species which are fossil only he makes seven. The number of recent species of *Pirenæ* he gives as four, but records none as fossil only. Under *Pirena terebralis* (*Melanopsis atra*) is a reference to Férussac's fossil *Melanopsides*, pl. 2, f. 7, &c.

Dr. Fitton records three species with a query, two under the names of *Melanopsis ? attenuata* and *M. ? tricarinata*, in the Weald-clay (Dorset), and Hastings sand (Sussex), and the third, without a name, in the Purbeck beds (Bucks).

* MELANORRHŒA, a genus of the natural family of Terebinthaceæ, tribe Anacardiaceæ, so called from the brown fluid turning black upon exposure to the air, with which every part of the principal species abounds. This tree (*M. usitata*) is familiarly known as the Burmese varnish-tree,

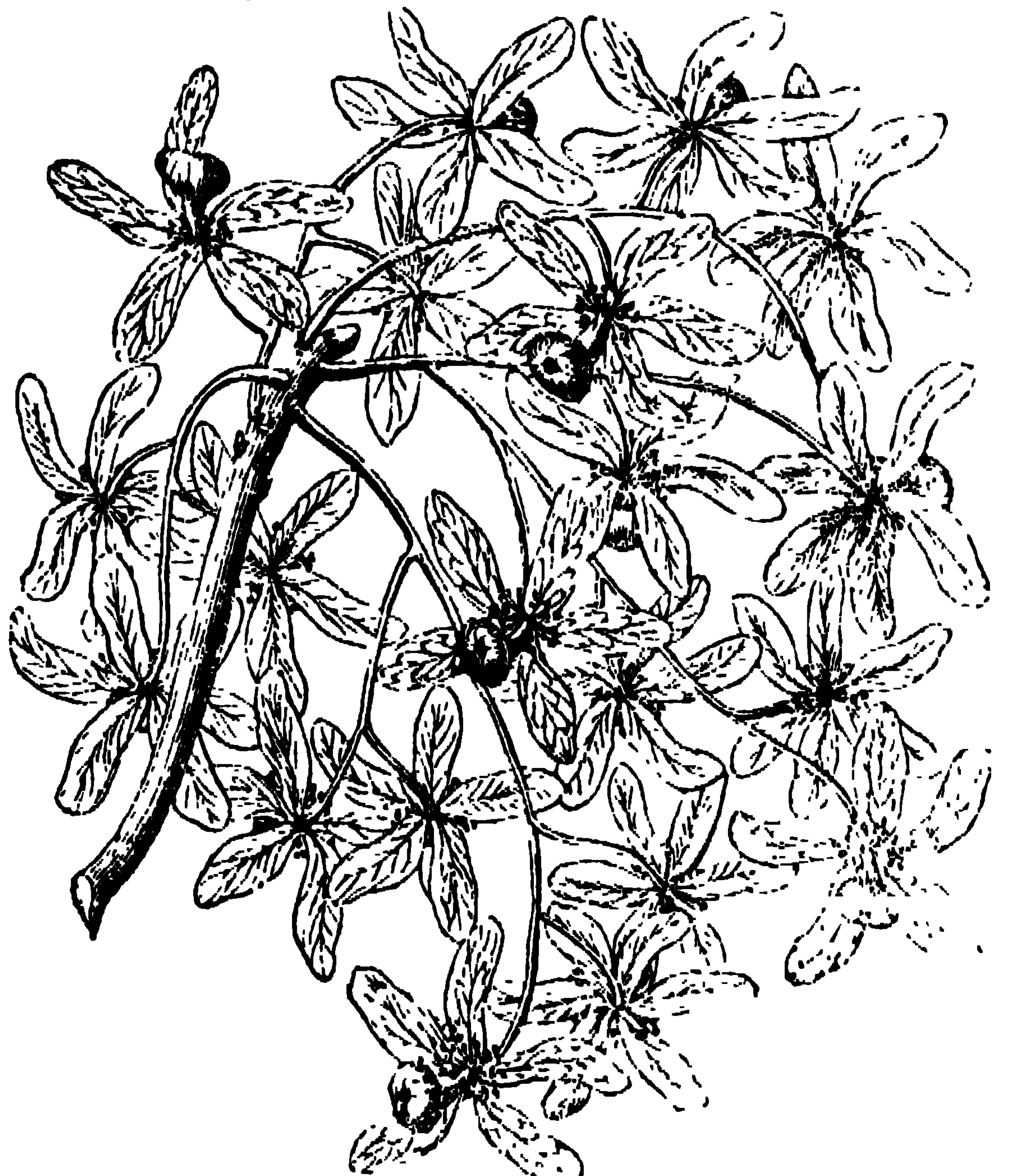
or theetsee, but was not described by botanists until discovered by Dr. Wallich, and figured in his splendid work 'Plantæ Asiaticæ Rariores,' t. 11 and 12. The tribe to which it belongs, abounds in plants yielding a blackish, acrid, and resinous juice used for varnishing and other such purposes, as the Marking Nut and the Japan Varnish-tree. This tree was first seen near Prome, and is found in different parts of Burma and along the coast from Tenasserim to Tavoy, extending from the latter in 14° to 25° N. lat., as Dr. Wallich has identified it with the *Kheu* or Varnish-tree of Munipur, a principality in Hindustan, bordering on the north-east frontier districts of Silhet and Tippera. It grows especially at Kubbu, an extensive valley elevated about 500 feet above the plains of Bengal, and 200 miles from the nearest sea-shore. There it attains its greatest size, some, and those not the largest, having clear stems of 42 feet to the first branch, with a circumference near the ground of 13 feet. It forms extensive forests, and is associated with the two staple timber-trees of continental India, Teak and Saul (*Tectona grandis* and *Shorea robusta*), especially the latter, and also with the gigantic Wood-oil tree, a species of *Dipterocarpus*. A second species of the genus, *M. glabra*, has been obtained by Dr. Wallich from Tavoy.

The Theetsee forms a large tree, with the habit of Semecarpus, and abounds in every part with a viscid ferruginous juice, which quickly becomes black by the contact of the atmosphere. Its leaves are large, coriaceous, simple, very entire, and deciduous. The panicles of flowers are axillary, oblong; those of the fruit simple and lax, with very large rufous and finally ferruginous involucres. It sheds its leaves in November, and continues naked until the month of May, during which period it produces its flowers and fruit. During the rainy season, which lasts for five months, from the middle of May until the end of October, it is in full foliage.



A branch with leaves.

At Prome a considerable quantity of varnish is extracted from this tree, but very little at Martaban. It is collected by inserting a pointed joint of a bamboo, which is closed at the other end, into wounds made in the trunk and principal boughs, which are removed after twenty-four or forty-eight hours, and their contents, which rarely exceed a quarter of an ounce, emptied into a basket made of bamboo and rattan previously varnished over. The collecting season lasts from January to April. In its pure state it is sold at Prome at about 2*s* 6*d*. for about 3½ lbs. avoirdupois. (Wallich.) Mr. Smith, who was long resident at Silhet, and was acquainted with this substance in 1812, states that it is procurable in great quantities from Munipur, where it is used for paying river-craft and for varnishing vessels designed to contain liquids. The drug, he says, is conveyed to Silhet for sale by the merchants, who come down annually with horses and other objects of trade. In Burma, Dr. Wallich states that almost every article of household furniture intended to contain either solid or liquid food is lacquered by means of it. The process consists in first coating the article with a layer of pounded calcined bones, after which the varnish is laid on thinly, either in its pure state or variously coloured. The most difficult part consists in the drying. It is also much employed in the process of gilding: the surface, being first besmeared with this varnish, has then the gold leaf immediately applied to it. Finally, the beautiful Pali writing of the Burmese on ivory, palm-leaves, or metal, is entirely done with this varnish in its native and pure state. Some difference of opinion exists as to the effects of this juice on the human frame. Dr. Wallich states that it possesses very little pungency, and is entirely without smell, and that both Mr. Swinton and himself have frequently exposed their hands to it without any serious injury, and that the natives never experience any injurious consequences from handling its juice; but he has known instances where it has produced extensive erysipelatous swellings attended with pain and fever. Sir D. Brewster, on the contrary, considers it a very dangerous drug to handle, one of his servants having been twice nearly killed by it. (Wallich, *Pl. As. Rar.*, i., p. 9, t. 11 and 12; and *Edinb. Journ. of Science*, viii., p. 96 and 100.)



A naked fruit-bearing branch, with the large involucres.

MELANO'SIS is a malignant disease distinguished by the deposition of a peculiar soft morbid substance, of which the most prominent character is a deep brown or black colour. This substance may be deposited in separate masses, or infiltrated into the tissue of different parts of the body, or it may be effused from the blood in a fluid form into natural or morbidly formed cavities, or separated from it with the secretions. The deposition of melanotic matter generally takes place successively in numerous parts of the body, producing in all the injurious effects of compression and irritation, till it proves fatal either by its direct influence on some important organ or by the exhaustion which it gradually induces.

MELANTERITE, one of the mineralogical names for native sulphate of iron, or green vitriol. [IRON.]

MELANTHA'CEÆ are a natural order of poisonous Endogens, very nearly related to Liliaceæ, from which indeed they are only to be distinguished with certainty by their anthers being turned towards the sepals and petals, and by their styles or carpels being distinct or at least separable. The species vary exceedingly in their appearance, some being subterranean-stemmed herbaceous plants, producing a few flowers without their leaves just above the surface of the ground, as is the case with Colchicum; others forming a stem of considerable size with large leaves and numerous flowers. The consequence of this difference

in their manner of growth is a considerable difference in the appearance of the species, but they are all found to conform to the characters of Liliaceæ, with the difference above explained. Iridaceæ, to which they bear a striking resemblance, because of the similarity between Colchicum and Crocus, are readily distinguished by their inferior fruit and triandrous flowers.

The most important species of this order are medical plants, viz.: Colchicum, or Meadow Saffron, which is employed as a remedy for gout and rheumatism; Veratrum album, whose acrid poisonous rhizoma is White Hellebore; Asagræa officinalis and Veratrum Sabadilla, both of which furnish the seeds called Cebadilla, now largely consumed in the preparation of Veratria; and a few North American plants of less moment.



1. A diminished figure of Veratrum Sabadilla; 2, an expanded flower; 3, a vertical section through part of the ovary; 4 a ripe seed-vessel.

MELASO'MA. [SHRIKES.]

MELASTOMA'CEÆ, an extensive natural order of polypetalous Exogens, nearly related to Myrtaceæ. They have opposite ribbed leaves without any trace of dots;



1, A branch of Rhexia speciosa; 2, a vertical section of the flower; 3, a calyx; 4, a transverse section of the ovary.

anthers prolonged into a beak, and having in the bud their points curved downwards, and inserted into sockets between the side of the ovary and that of the calyx. The ovary itself is many-celled and many-seeded, and connected with the calyx by vertical plates, which form the partitions between the sockets in which the anthers are confined. The species are extremely numerous in tropical countries, where they usually form bushes or small trees, and are scarcely known beyond the tropics, with the exception of some Rhexias, which straggle into North America. In Europe the order is unknown, unless in gardens, where many species are cultivated for the sake of their gay purple or white flowers. Some of the species bear berries, which are eatable, and stain the mouth a deep purple, whence their name Melastoma, or black-mouth; otherwise they are of no known use to man; not a trace of aromatic secretions being found in them, notwithstanding their near relationship to the aromatic Myrtaceæ.

MELAZZO. [MESSINA.]

MELCOMBE REGIS. [WEYMOUTH.]

MELEA'GER. [ANTHOLOGY.]

MELEAGRI'NA. [AVICULA; MALLEACEA.]

MELEA'GRIS, the generic name for the Turkeys. [TURKEY; PAVONIDÆ.]

MELES. [BADGER.] N.B. Remains of a Fossil Badger, *Meles vulgaris fossilis* (*Ursus Meles*, Linn.), occur in the Bone-caves at Lunel and in Brabant.

MELI, GIOVANNI, born at Palermo, in Sicily, about 1740, studied medicine, in which science he took the degree of doctor, and afterwards became professor of chemistry in the university of his native city. But he is best known for his poetical compositions in the vernacular dialect of Sicily, which have earned him the name of the modern Theocritus. His pastoral poems are equal, if not superior, to any compositions of the same kind which Italy has ever produced. The luxuriant beauty and variety of Sicilian scenery inspired the author, who has faithfully portrayed in his eclogues the various appearances of the seasons in that fine climate, as well as the rich tints of the sky, the bold features of the mountains and coasts, the occupations of the shepherd and the husbandman; and he has enlivened his description with love-songs, which have become popular in Sicily, and have been set to music for the favourite native instrument, the guitar. One of his finest songs, beginning

'Sti silenzii, sta virdura,
Sti muntagni, sti vallati,'

is given with an English translation, and other specimens of Meli's poetry, in an article 'On the Dialects and Literature of Southern Italy,' in No. IX. of the 'Foreign Quarterly Review,' November, 1829.

Meli has excelled particularly in his 'Ecloghe Pescatorie,' or fishermen's dialogues, in which he has borrowed the peculiar language and humour of that class of people. Unlike Guarini, Tasso, and other courtly writers of pastoral poetry, Meli makes his shepherds, husbandmen, and fishermen speak their own homely and unpretending language, which is nevertheless susceptible of poetical imagery. The seventh idyll is in a loftier key: it is the lamentation of Polemuni, a man persecuted by fate, forsaken by his fellow-creatures, a despairing outcast, who is represented as seated on a lonely cliff which overhangs the deep waves that have wasted the base of the rock, and have hollowed out caves in it, within which the surge roars in dark eddies. The halcyon has built its nest on the bare sides of the cliff, and its melancholy cry is heard far over the foaming billows. Polemuni was the son of a substantial fisherman, who himself followed for a time his father's trade, had a tight gallant boat, and store of nets and tackle: when on shore he was the gayest of the gay, and the favourite of the girls of his district. Misfortune came: a storm swamped his boat, his love proved faithless, and he found himself slighted and forsaken by all. Houseless and almost naked, he is sitting on the lone cliff with his poor reed in his hand, attempting to follow his wonted occupation, while he vents his grief in song. He remembers his former happy days, and contrasts them with his present bereavement; he rails at the faithlessness of pretended friends, he sees the gloom of despair closing all around him, until at last a fearful tempest breaks forth, the waves swell beyond all bounds, and, rising in one mountain billow, overflow the cliff, and hurl the devoted victim down into the abyss of the sea.

Meli's odes, which fill the second volume of his works,

are mostly amorous, though not indecent. Some of them are exquisitely finished, such as 'Lu Labbru' (the lip), and 'Lu Pettu' (the breast). An Italian version of them has been published by Professor Rosini of Pisa, which however is inferior in gracefulness to the original.

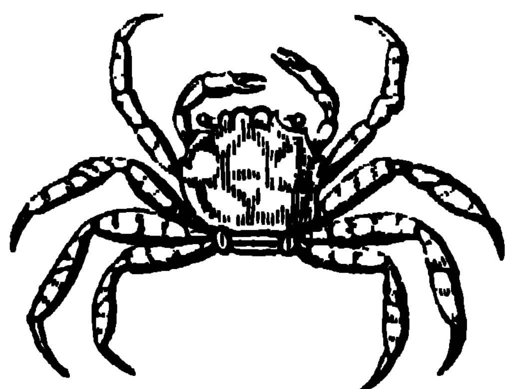
Meli has written a mock heroic poem, under the title of 'Don Chisciotti' (Don Quixote), in twelve cantos, which is a sort of imitation of Cervantes's celebrated novel. It abounds with beauties of detail, but the ludicrous prevails throughout, and often becomes mere farce. He also wrote a volume of fables, besides satires, some of which reflect on peculiar features of Sicilian life and manners, and other minor poems. His works were collected and published at Palermo, under his own revision, in 1814, in seven volumes. King Ferdinand granted the author a copyright for ten years, and gave him also a small pension, for which the author expresses his gratitude in one of his compositions. Meli died, not long after, at an advanced age.

The Sicilian dialect has assumed, under his pen, a delicacy of refinement which places it foremost among the written languages of Italy. Some remarks on the Sicilian and other Italian dialects, with specimens of their poetical capabilities, are given in an article 'On the Study of the Italian Language and Literature,' in No. X. of the 'Quarterly Journal of Education.'

ME'LIA (Zoology), M. Latreille's name for a genus of *Cancerians* (*Lybia* of M. Milne Edwards, who has since withdrawn the name in favour of M. Latreille's prior appellation). This form approximates to *Pilumnus*, but has also some analogy with *Grapsus*.

Example, *Melia tessellata*. Colour whitish with red lines; some hairs on the feet. Length about five lines.

Locality, Isle of France.



Melia tessellata.

ME'LIA, so called from Μελία, the Greek name of the common ash, which one species of the genus is thought to resemble in foliage. It belongs to the natural family *Meliaceæ*, to which it has given its name, and which is, like Melia, characterised by having the filaments of the anthers combined into a tube, with the anthers sessile within it, and opening inwards; the seeds without wings. The species are few in number, and chiefly Indian; one is naturalised in the South of Europe, and one is found in North America; of these, *Melia Azadirachta*, the *Neem tree* or *Margosa tree* of the Peninsula of India, has been separated into a distinct genus on account chiefly of its ternary, not quinary, structure of the parts of the pistil, and its single-seeded fruit. This has been named Azadirachta from the Persian (*Azad-i-durukht*, the excellent tree). Its bark is bitter, and considered a valuable tonic. The fleshy part of the fruit (like that of the olive) yields a fixed oil, which is bitter, and considered anthelmintic and stimulant. The leaves are universally used in India for poultices, and both the flowers and seeds are irritating and stimulant. According to Dr. Ainslie a kind of toddy is procured by fermenting the sap of healthy young margosa-trees.

Melia Azedarak, sometimes called Persian lilac, Pride of India, and Common Bead-tree (*Hill Margosa*, by Dr. Ainslie), is said by Dr. Roxburgh to be a native of China: it is also a native of the North of India. It is much cultivated in the southern parts of the United States of America. It is called *dek* in the north provinces of India, and may be confounded with another species under the name Azedarach by Avicenna. When in flower it has some resemblance to the lilac, and its flowers are very fragrant. The berries are sweetish, and, though said to be poisonous, are eaten by children in the United States without inconvenience, but are reputed to be a powerful vermifuge. The bark of the root in its recent state has a bitter nauseous taste, yielding its virtues to boiling water, and is cathartic and emetic, and considered in the United States an efficient anthelmintic, and also useful in infantile remittents.

Melia Bukayun is distinguished by Dr. Royle from the West Indian *M. sempervirens* of Schwarz, with which it was united by Dr. Roxburgh. This tree appears to be a native of Persia, though common throughout India: it is called by the Arabs *ban*, and by the Persians *azad i-durukht*. It is probable therefore that this may be one of the trees included under the *Azedarach* of Avicenna. The seeds are bitter, and considered laxative and anthelmintic, as is also the bark. *M. tomentosa* is a species found in the island of Penang, and *M. composita*, in which are included both *M. superba* and *M. robusta*, is a species found in Malabar and Mysore.

MELIA'CEÆ, a natural order of polypetalous Exogens, distinguished from all others by their stamens being united into a complete cup, within, and often below, the rim of which the anthers are inserted. It consists of trees or shrubs with alternate, often compound, leaves, inhabiting all countries within the tropics, but very rare in colder climates; the Melia Azedarach, or Bead-tree, a Syrian plant, now naturalised in the south of Europe, forming the principal exception. In general the species are bitter and astringent, but they are sometimes dangerously poisonous, acting violently as emetics and purgatives. Notwithstanding this, the pulpy fruit of the Lanseh is esteemed in the Indian Archipelago, and that of Milnea edulis is eaten in Silhet, where it seems to resemble the Litchi and Longan of China.



1. Trichilla spondioides; 2, an expanded flower; 3, a ripe fruit; 4, a transverse section of the same.

MELICERTA. (Zoology.) [PULMOGRADA.] *Melicerta* and *Melicertus* are also used to designate genera of Crustaceans. [SALICOQUES.]

MELILOT, the Melilotus or Honey-lotus of botanists, so called from its smell, is a tall yellow-flowered annual. It has loose racemes of small flowers formed like those of Clover, of which it was once regarded as a species. The Melilotus officinalis, or *Trifolium Melilotus officinalis* of Linnæus, has long roots and a branching stem two or three feet high. It grows wild in woods, hedges, and neglected fields. When cultivated in a dry soil and made into hay, it has a powerful aromatic smell, and mixed in a small proportion with meadow-hay, gives it an agreeable flavour. This plant is used in making the Swiss cheese called Schabzieger. It is ground in a mill, and mixed with the curd into a kind of paste, which is put into conical moulds and there dried. [CHEESE.]

The white or Siberian melilot rises several feet high, with a strong branching stem. It was strongly recommended by Thouin in a memoir addressed to the Agricultural Society of Paris in 1788, and has been tried occasionally with some success by various agriculturists, without however having been so generally adopted for cultivation as might have been expected from the high encomiums passed upon it. It will bear four cuttings in the year, and produces a very great quantity of green fodder. It should be cut before the stems become woody, and thus it will continue several years in the ground, although it is naturally only biennial. A light and moist soil suits this plant best.

MELI'NA, Schumacher's name for the genus *Perna* of authors. [MALLEACEA, vol. xiv., p. 335.]

MELINDA, or, as it is written in Captain Owen's 'Voyages,' Maleenda, is a port situated on the eastern shores of Africa, in about 3° S. lat. and 40° E. long. It derives its chief title to notice from the first voyage of Vasco de Gama, who sailed along the eastern coast of Africa as far north as this place, where he got a pilot from the king to conduct his vessel to India. Gama describes the town as situated on a plain near the sea-shore, surrounded with gardens, and consisting of houses neatly built of hewn stone, with handsome rooms and painted ceilings. It was at that time evidently a place of some importance. In 1605 the Portuguese, under Don Francisco d'Almeyda, took possession of this place, and, about twenty-three years later, they occupied Mombas also; and as the harbour of the latter is much superior, Melinda began to decline. It is not known when and in what manner it was taken from the Portuguese; but it seems that in the beginning of the last century it was in possession of the Arabs. Nor is it known in what manner it was lost by the Arabs; but when Captain Vidal visited the place in 1824, he found that the territories of the antient kingdom of Melinda were totally occupied by the Galla, a savage nation, which has carried its conquests from the southern declivity of the Abyssinian Alps as far south as Melinda. On the site of the town Captain Vidal found nothing but ruins, and he thinks that it has been entirely destroyed by the Galla in their wars against the Arabs, who possessed and still possess most of the ports along this coast. (Owen's *Narrative of Voyages to explore the Shores of Africa, &c.*)

MELI'PHAGA. [MELIPHAGIDÆ.]

MELIPHA'GIDÆ (Honey-suckers), a family of Tenuirostral birds. [TENUIROSTRES.]

Mr. Vigors, in his paper 'On the Natural Affinities that connect the Orders and Families of Birds' (*Linn. Trans.*, vol. xv.), thus generally refers to the *Meliphagidæ*. 'That extraordinary group, the existence of the much more considerable portion of which was unknown to the Swedish naturalist, for which there was consequently no place in his system, occupies a prominent and important situation in the ornithological department of nature. Chiefly confined to Australasia, where they abound in every variety of form, and in an apparently inexhaustible multitude of species, they find a sufficient and never-failing support in the luxuriant vegetation of that country. There the fields are never without blossom, and some different species of plants, particularly the species of *Eucalyptus*, afford a constant succession of that food which is suited to the tubular and brush-like structure of the tongue in these birds. Their numbers and variety seem in consequence to be almost unlimited. Like the *Marsupial Animals* of the same country, a group to all appearance equally anomalous, which contains within its own circle representatives of all the other groups of the *Mammalia*, this division of birds comprises every form which is observable among the families of the *Insessores*. From the powerfully constructed and strong-billed *Corvidæ* and *Orioli*, down to the slender *Merops* and the delicately shaped *Cinnyris*, every *Insessorial* group has its analogous type in this family. Their approach to the *Scansorial* tribe is strongly conspicuous. The hind toe of the greater portion of the group is long, powerful, and apparently formed for climbing, as Mr. Lewin has pointed out in his generic description of *Meliphaga* (*Birds of New Holland*). In this point of view they seem in Australasia to supply the place of the genuine *Pici*; no species of *Woodpecker*, as far as I have been able to ascertain, having hitherto been found in that country. This strong affinity to the *Scansores* is preserved by their forming one of the extremes of the present circle, which comes in contact with that tribe. I have indeed some doubts whether, in consequence of this affinity, they may not be even still more intimately united to that group, and form the immediate point of junction of the present tribe with the *Certhiadæ*. I have consequently entered them and their conterminous families into the tabular series with a mark of uncertainty. Time, with more accurate examination of their manners and internal economy, will clear away, it is to be hoped, these and similar points of doubt respecting groups so interesting. The following facts however are, I think, sufficiently decided, namely, that the three groups, the *Promeropidæ*, *Meliphagidæ*, and *Nectariniadæ*, constitute distinct and prominent divisions in the tribe, of which, by that generally stronger and more perfect conformation which distinguishes them from the more typical families, they form the aberrant groups; that they are united among themselves by general affinities; and that they connect the tribe on each side with the conterminous tribes that approach it, that is, with the *Scansores* at the one extreme, and with the *Fissirostres*, where we first entered on the order, at the other.'

Mr. Swainson (*Classification of Birds*, vol. i.), after observing that he never had the opportunity of examining the tongue of the African Sun-birds (*Cinnyridæ*), states that by a fortunate chance he had discovered that the type among the Australian Honey-suckers (*Meliphagidæ*) which represents the *Trochilidæ*, has the tongue constructed precisely the same as in those birds. 'This brings us,' continues Mr. Swainson, 'to the second description of extensible, or rather of suctorial tongues, and which is of a form almost peculiar to the honey-suckers of Australia and its islands. In these birds the tongue is not nearly so extensible as in the *Trochilidæ*, being seldom more than half as long again as the bill; nor are the bones of the *os hyoides* carried back upon the skull, as in the woodpeckers and humming-birds. Nevertheless the structure appears especially adapted for suction; the form of the lower part is the same as in ordinary birds, but the end is composed of a great number of delicate fibres or filaments exactly resembling a painter's brush. Lewin, who drew and described these birds in their native region, has figured the tongue of the warty-faced honeysucker (*Meliphaga Phrygia*) (*Birds of New Holland*, pl. 4), and describes the bird as sometimes to be seen 'in great numbers, constantly flying from tree to tree (particularly the blue gum), feeding among the blossoms by extracting the honey with their long tongues from every flower as they passed.' What will appear still more extraordinary to the scientific naturalist is the fact that some birds of this meliphagous group are actually woodpeckers, and yet retain the typical structure of the tongue of their own natural family. The same observer, speaking of the blue-faced honey-sucker, describes it as being 'fond of picking transverse holes in the bark, between which and the wood it inserts its long tongue in search of small insects, which it draws out with great dexterity.' Now, as Lewin describes this bird as a honey-sucker, we must conclude, until facts prove otherwise, that it has the filamentous tongue of the honey-suckers, but that it is used for the purpose, not of spearing insects, but of catching them by means of the glutinous matter on the filaments, a mode of capturing its prey by no means improbable, provided the insects are of small size. It must not be supposed however that the food of the *Meliphagidæ*, several of which are as large as a thrush, and three or four much larger, is restricted, any more than that of the humming-birds, simply to the nectar of flowers. They indeed feed upon the honey, but, as Lewin declares, combined with the numerous small insects lodged in most of the flowers, which they extract in a dexterous manner with their tongues, peculiarly formed for that purpose. It is clear however, when we come to reflect upon the matter, that birds which are attached to the secretions of particular trees, as are many of the *Meliphagidæ*, can only enjoy their favourite food for a comparatively short season, that is, while the tree or plant is in blossom. They must therefore either feed at other times upon small insects or upon fruit. The two first habits we have shown them to possess; and the last, that of devouring fruits also, is exemplified in the yellow-eared honey-sucker of Lewin, who remarks that 'in the winter season these birds have been seen feeding on the sweet berry of the white cedar in great numbers.'

Mr. Swainson makes the *Meliphagidæ* the first family of the tribe *Tenuirostres*; and he thus characterizes these *Honey-suckers*:—

Bill the strongest in this tribe (*Tenuirostres*), having the mandible distinctly notched. *Feet* large, strong; the hinder toe much developed. *Tongue* extensible, generally ending in a bunch of filaments.

The following genera and subgenera are placed by this author under the Meliphagidæ.

Genera. Meliphaga. (Lewin.)

Bill moderate or short, weak; the under mandible not thickened. Lateral *toes* unequal; the inner the shortest. *Tail* rounded or graduated. Tongue bifid; each division ending in numerous filaments. (Sw.)

Subgenera:—*Meliphaga.* (Example, *Meliphaga barbata.** 'Ois. Dor.,' pl. 57, and *M. Australasiana.*) *Ptilotis* (Sw.), leading to *Glyciphila.* (Example, 'Lew. Bds.,' pl. 5.) *Zanthomiza* (Sw.). (Example, *Zanthomiza Phrygia*, Shaw. 'Zool. of N. H.,' pl. 4, the tenuirostral type.) *Anthochæra*† (Horsfield and Vigors), the rasorial type. (Example, *Anthochæra carunculata.* White's 'Voyage,' pl. 6.)

Glyciphila. (Sw.)

Habit of *Meliphaga.* *Bill* either shorter or slightly longer than the head; the notch in the upper mandible far removed from the tip. *Tongue* rather short, terminated by numerous filaments. The third and three following *quills* longest and nearly equal. Lateral *toes* equal. *Tail* even. (Sw.)

(Example, *G. fulvifrons.* Lewin, *N. H. Birds*, pl. 22.)

Anthomiza.

Habit of *Meliphaga.* *Bill* rather short. *Tongue ?* *Wings* much rounded; all the quills more or less terminating in points. *Tail* forked. Lateral *toes* equal. The fissirostral type. (Sw.)

Example, *A. cærulocephala.* ('Mus. Carl.,' i., pl. 5.)

Leptoglossus. (Sw.)

Habit of *Cinnyris.* *Bill* remarkably long, slender, and curved. *Tongue* retractile, long, bifurcated, as in *Trochilus.* Lateral *toes* unequal. *Tail* nearly even. The tenuirostral type. (Sw.)

Example, *L. cucullatus.* ('Ois. Dor.,' pl. 60.)

Ptiloturus. (Sw.)

Bill much lengthened, slightly curved; the upper mandible dilated, and folding over the base of the under; the margins of both inflected towards their tips. *Nostrils* lengthened; the aperture linear. *Wings* moderate, rounded; the first quill spurious; the four next very broad at their base, and emarginate at the inner web. Lateral *claws* unequal. *Tail* very long, graduated; the middle feathers lax and narrow. The rasorial type. (Sw.)

Example, *P. Capensis.* (Le Vaill., 'Af.,' vi., pl. 287, 288.)

Manorhina. (Vieill.)

Bill short, robust; the under mandible thickened: culmen arched, and much elevated from the base, considerably compressed its whole length; commissure curved; upper mandible notched near the tip.

Example, *M. viridis.* ('Ill. of Orn.,' pl. 78.)

Subgenera:—*Gymophrys* (Gymnophrys?) (Sw.). Example, *G. torquatus.* (Lewin, 'N. H. Birds,' pl. 24.) *Eidopsarus* (Sw.). (Example, *E. bicinctus.*)

Entomiza. (Sw.)

Bill strong, moderate; culmen much elevated. *Nostrils* large, naked; the aperture large, oval, and placed in the middle of the bill, at the termination of the naked membrane; culmen obtuse, convex. Frontal feathers small, compact. Hind *toe* and *claw* very large, and as long as the middle toe.

Example, *E. cyanotis.* (Lewin, 'N. H. Birds,' pl. 4.)

Philedon. (Cuv.)

Culmen sharp, carinated. Head and face naked. *Front* with an elevated protuberance. Hind *toe* and *claw* shorter than the middle.

Example, *P. corniculatus.* (White's 'Voy.,' pl. 16.)

Myzomela. (Horsf. and Vigors.)

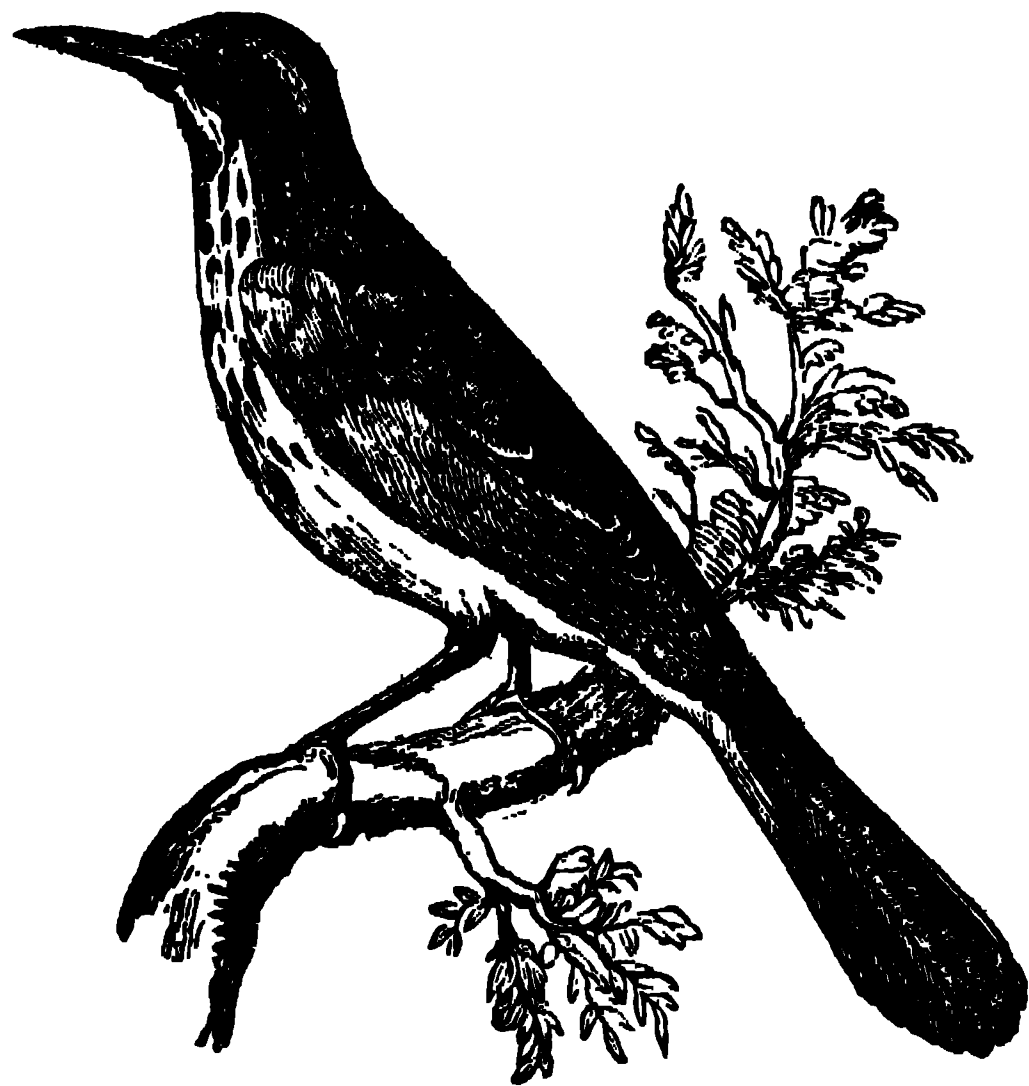
Bill with both mandibles very considerably curved; the sides broad and much compressed. *Tongue* and *nostrils* as in *Meliphaga.* *Wings* lengthened; the third, fourth, and fifth quills equal. *Tail* short, even. Middle *toe* much longer than the hinder; lateral toes equal.

Example, *M. cardinalis.* (Lewin, 'N. H. Birds,' pl. 19.) Mr. Swainson inquires whether this can be the fifth subgenus of *Meliphaga ?* or an aberrant *Melithreptes ?*

Mr. Vigors and Dr. Horsfield, in their 'Description of the Australian Birds in the Collection of the Linnean Society,' after remarking on the then (1826) imperfect state of knowledge with regard to this group, and the constant influx of new species from New Holland and the Australian Islands, observe that the then known species exhibited five prominent modifications of form, according to the variation chiefly of the characters of the bill and tail, and that they wished to consider these types of form as sections only of the group which they name provisionally the genus *Meliphaga.* When the species should become more known, they express their opinions that the sections there marked out might justly be considered genera, and the higher group be denominated *Meliphagina.* 'When this subdivision takes place,' say our authors in conclusion, 'the section which stands first in our text may be considered the true *Meliphiga.*' The *Meliphaga Novæ Hollandiæ* will form the type. It may be thus characterised:—*Bill* rather slender, subelongate; the *culmen* arched, subcultrated at the base; *nostrils* longitudinal, linear, very narrow, covered above by a membrane, and exceeding the middle of the bill in length. *Tongue* furnished at the apex with many bristles. *Wings* moderate, somewhat rounded; first *quill* short; second, third, and fourth (which last is longest) gradually longer; the third and fifth, the second and sixth, equal: external beards (pogoniæ) of the third to the seventh inclusive widest in the middle. *Tail* subelongate, rounded. *Feet* rather strong; *hallux* subelongate, strong; acrotarses scutellated.

Example, *Meliphaga Novæ Hollandiæ.*

Mr. Caley says, 'This bird is most frequently met with in the trees growing in scrubs, where the different species of *Banksia* are found, the flowers of which, I have reason to think, afford it a sustenance during winter. In the summer I have shot it when sucking the flowers of *Leptospermum flavescens.* In the scrubs about Paramatta it is very common.'



Meliphaga Novæ Hollandiæ.

The following are the sections given by Mr. Vigors and Dr. Horsfield.

*

Tail rounded, bill rather long and slender.
Mel. Novæ Hollandiæ, Australasiana, and *melanops.*

* *

Tail rounded; bill rather shorter, and rather strong.
Mel. auricomis, chrysotis, and *leucotis.*

* * *

Tail equal, bill rather short, strong. (*Melithreptus* of Vieillot?)
Mel. chrysops, lunulata, indistincta, and *brevirostris.*

* * * *

Tail equal, bill rather short and slender.
Mel. cardinalis.

* * * * *

Tail equal, bill rather slender and longer.
Mel. tenuirostris, fulvifrons.

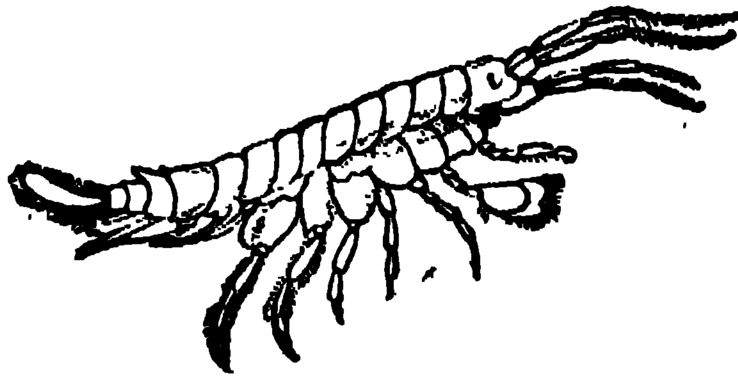
The other genera recorded by Mr. Vigors and Dr. Horsfield are *Myzantha* (V. and H.), *Anthochæra, Tropidorhynchus* (V. and H.), *Sericulus* (Sw.), *Mimeta* (King), *Psophodes* (V. and H.), and *Pomatorhinus* (Horsf.).

* Certhia Novæ Hollandiæ of old authors; and of which Mr. Swainson is led to believe M. Sericea is only a sexual difference.'

† Mr. Swainson has the following note to *Anthochæra*:—'I hardly think it advisable to discriminate these subordinate types by subgeneric names; but as that of *Anthochæra* has been already done, I have designated what appears to me to be three of the others; the fifth I am unacquainted with.'

ME'LITA, Dr. Leach's name for a genus of Amphipodous crustaceans generally found beneath stones on the seashores.

Example, *Melita palmata*, *Cancer palmatus*, Montagu. Colour blackish; antennæ and feet annulated with pale greyish.



Melita palmata, enlarged.

MELITÆA. This term is employed by Peron and Blainville for a group of Medusidæ, by Lamarck and Lamouroux for Polypiaria, analogous to Isis and Gorgonia. [POLYPIARIA CORTICIFERA.]

MELITHREPTUS. [MELIPHAGIDÆ; SOUI-MANGA.]

ME'LITO, SAINT, was bishop of the church at Sardis in Lydia, in the second century. He is supposed by some to have been the angel of the church at Sardis, to whom St. John addressed the epistle in *Rev.*, iii. 1-6; but this conjecture is not supported by any antient writer, and it is also improbable on account of the length it assigns to the episcopate of Melito.

By Polycrates, bishop of Ephesus, in the second century, he is called 'Melito the Eunuch,' probably because he lived in celibacy, in order the better to discharge the duties of his office: the same writer adds, that he was guided in all his conduct by the influence of the Holy Spirit. (Euseb., *Hist. Ecc.*, v. 24.) Tertullian, as quoted by Jerome, praises his eloquent and oratorical genius, and says that he was thought by many to be a prophet. Yet he has been charged with heterodoxy; but upon no better grounds than the titles, or perhaps a misunderstanding of the titles, of one or two of his works.

During the persecution of the Christians in the reign of Marcus Antoninus, Melito wrote an apology for them. It is addressed to the emperor, but we are not told whether it ever reached his hands. Eusebius, who has preserved an extract from this apology, places it in A.D. 170; Tillemont assigns to it the date of 175; Basnage and Lardner, that of 177.

Melito died and was buried at Sardis before the end of the second century.

Eusebius and Jerome have given lists of Melito's works, of which the most important is a 'Catalogue of all the Books of the Old Testament which are universally acknowledged.' This is the earliest catalogue of the O. T. Scriptures found in any Christian writer. It was obtained, as Melito himself informs us, in Palestine, whither he had travelled on purpose to procure it. It contains all the books at present received as canonical, except *Nehemiah* and *Esther*, of which the former is probably included under 'Esdras' (Ezra). The 'Proverbs of Solomon' are also called 'Wisdom.'

Melito wrote a book on Easter, a fragment of which is preserved by Eusebius, on the occasion of a controversy which arose in Laodicea concerning the time of keeping that feast.

All his other works are lost; but from the title of one of them, 'Concerning the Devil and the Revelation of John,' Lardner thinks it probable that he received the Apocalypse as canonical, and ascribed it to the Apostle John.

(Eusebius, *Hist. Ecc.*, iv. 26; Hieronymus, *De Vir. Illust.*; Du Pin's *Ecc. Hist.*, cent. 2; Cave's *Lives of the Fathers*, vol. i., p. 179; Lardner's *Credibility*, part ii., c. 15.)

MELIZO'PHILUS, Dr. Leach's name for a genus of Insessorial birds. [MERULIDÆ; SYLVIADÆ.]

MELLILITE, a mineral which occurs crystallized. Primary form a square prism. Scratches apatite. Colour reddish or greyish yellow. Lustre vitreous. Translucent. Specific gravity 3·24 to 3·28.

Fuses by the blow-pipe into a greenish glass; the powder gelatinizes in nitric acid. Found at Tivoli and Capo di Bove near Rome.

Analysis by Carpi:—Silica, 38·; Lime, 19·6; Magnesia, 19·4; Alumina, 2·9; oxide of Iron, 12·1; oxide of Manganese, 2·; oxide of Titanium, 4·

MELLITE. *Honey-Stone.* Occurs nodular, granular, and crystallized. Primary form a square prism. Fracture conchoidal. Hardness 2·0 to 2·5. Colour honey-yellow, orange-yellow. Streak white. Lustre resinous, vitreous. Translucent; transparent. Specific gravity 1·597. In the flame of a candle it becomes white and opaque. When more strongly heated it becomes black and falls to powder.

Found at Artern in Thuringia, in bituminous wood.

Analysis by Klaproth:—Mellitic acid, 46; Alumina, 16; Water, 38.

Mellitic Acid was discovered by Klaproth in mellite, which is a mellitate of alumina; this, when digested in carbonate of ammonia or potash, is decomposed, and the alkaline mellitate formed is to be decomposed by acetate of lead, by which mellitate of lead is precipitated, and this treated with hydrosulphuric acid is decomposed, and sulphuret of lead is precipitated, while mellitic acid remains in solution.

This acid has a sour bitter taste, is very soluble in water, and also in alcohol, and it crystallizes in colourless needleform crystals. Neither nitric nor hydrochloric acid produces any effect upon it, but it undergoes some change when heated with alcohol.

According to Liebig and Pelouze this acid consists of—

One equivalent of hydrogen	1·
Four equivalents of carbon	24·
Four equivalents of oxygen	32·
Equivalent .	57·

MELLI'VORA. [RATEL.]

MELLON, a compound of azote and carbon, discovered by Liebig, and which, like cyanogen, consisting of the same elements in different proportions, is considered as a compound radical. When dry sulphocyanogen is heated to redness in a retort, it is decomposed; there are obtained a considerable quantity of sulphur and sulphuret of carbon, and there remains a substance of a lemon-yellow colour, which is mellon.

The properties of this substance are, that it has a yellow colour; is insoluble in water, alcohol, dilute hydrochloric or sulphuric acids; but it is dissolved and decomposed by nitric acid and the solutions of potash and soda; and with the last mentioned, ammonia is evolved. Mellon decomposes the iodide, bromide, and sulphocyanide of potassium, when fused with them, iodine, bromine, and sulphocyanogen being evolved. When heated with potassium it forms mellonuret of potassium, which, being dissolved in boiling water, and nitric, hydrochloric, or sulphuric acid being added to the solution, hydromellonic cid is formed, which is precipitated, in the state of hydrate, as a dirty white gelatinous substance, which becomes yellow on drying: it is slightly soluble in water, has a weak acid reaction, and is not decomposed by hydrochloric or nitric acid.

Mellon is composed of—

Six equivalents of carbon .	36
Four equivalents of azote .	56
Equivalent .	92

and this, with one equivalent of hydrogen = 1, forms 1 equivalent of hydromellonic acid = 93.

MELMOTH, WILLIAM, bencher of Lincoln's Inn, born in 1666, died in 1743. The work by which his name is known is 'The great Importance of a Religious Life,' a book of which the author was not known till after his death, and which was ascribed by Walpole to the first earl of Egmont. Nichols mentions, in his 'Literary Anecdotes,' that since the death of Melmoth to his time above 100,000 copies of this work had been sold.

MELMOTH, WILLIAM, son of the above, born in 1710, died in 1799, was appointed commissioner of bankrupts by Sir Eardley Wilmot. He was twice married, first to the daughter of the well-known Dr. King, secondly to Mrs. Ogle. He was an accomplished scholar, though not educated at either University, and his translations of the Epistles of Pliny, those of Cicero to his friends, and the treatises on Old Age and Friendship, are generally allowed to be the best in the English language. These translations are made in an easy and pleasing but rather diffuse style. He was the writer of 'FitzOsborne's Letters, containing dissertations both moral and literary.' He wrote a treatise on the Christian Religion, and Memoirs of his father. Both Birch and Warton, the former in his life of Tillotson, the

latter in a note on Pope's works, mention Melmoth's translations with the highest praise. He also wrote a poem on Active and Retired Life, in Dodsley's 'Collection,' which is characterised by smooth versification and sound morality. (Chalmers's *Biographical Dictionary; Nichols's Literary Anecdotes.)*

MELO (Malacology), Broderip's name for a subgenus of *Voluta*. [VOLUTA.]

MELOBE'SIA, a genus of Polypiaria, proposed by Lamouroux. The small porous plates of this stony substance are attached to the leaves of marine plants.

MELOCRI'NUS, a genus of Crinoidea, employed by Goldfuss in his 'Petrifacta Europæ' for some fossils of the transition limestone. It has not yet been mentioned as British. [ENCRINITE.]

MELODRAMA. [ENGLISH DRAMA, p. 409.]

MELODY (μελῳδία), in music, is Air or Song—a succession of single diatonic sounds, in measured time.

Melody and Air are synonymous terms in modern music, whatever their difference may have been in that of antient Greece; we therefore shall add but little to what we have already said on the subject under the word AIR, to which the reader is particularly referred.

The question—which exercises most influence over the mind, melody or harmony? has often been agitated, Rousseau taking the lead, who certainly has treated it eloquently, but inconsistently, acting the part of advocate on both sides, and on each refutes himself. He seems to admit, and thus to agree with Metastasio, that music is a kind of language, but overlooks the fact, that, like every other language, it can only affect those who understand it by either studying its principles, as in the case of the few, or by frequently hearing, and thus becoming empirically acquainted with it, as in the case of the many. He does not seem to have considered that simple music, that is, melody, like simple language, makes most impression on the unlearned majority, because easily understood; while complex music, namely, harmony, like high-wrought rhetoric, excites more pleasure in the minds of the instructed minority, who enter into its combinations and perceive all its relations. Melody and harmony may be said to generate each other, the one being a selection of single sounds from a harmonic source, the other a union of two or more melodies simultaneously heard. Thus both are closely connected; and Dr. Burney has remarked, that after melody and harmony have been heard together, nothing can compensate for their separation.

ME'LOE VESICATO'RIUS. [CANTHARIS.]

MELOGALLIC ACID. The reference to this article under GALLIC ACID is a typographical error. It should have been Metagallic Acid. [METAGALLIC ACID.]

MELOLO'NTHIDÆ, a family of Coleopterous insects of the section *Lamellicornes*, and subsection *Phyllophagi*. This family, of which the common cockchafer (*Melolontha vulgaris*) is an example, may be thus characterised: labrum transverse, and in most instances deeply cleft in the middle; mentum as long as broad, or with the length exceeding the breadth; sometimes nearly heart-shaped, and sometimes square; the anterior margin either straight or notched in the middle, but without any projecting process or tooth; mandibles strong and horny, and having at most but a single membranous appendage, which is situated in a concavity on the inner margin; the apex truncated, and having two or three denticulations; maxillæ generally horny, and armed in most cases with five or six denticulations; antennæ usually with more than three lamellated joints; all the tarsi terminated by two claws, which are usually furnished with a spine on the under side near the base, and sometimes divided at the apex.

The family Melolonthidæ consists of three genera: *Melolontha, Rhizotrogus*, and *Serica*, and some subgenera of minor importance. Species of this family are found in all parts of the world. In the genus Melolontha the antennæ are ten-jointed; the terminal five, six, or seven joints are lamellated, and form a large fan-like appendage; in the females the lamellated joints form a smaller club than in the males, owing to their smaller size, and also to a decrease in their number, there being six, five, or four; the labrum is deeply cleft on its lower margin; the claws of the tarsi are furnished with a spine on the under side near the base; the abdomen in the male sex often terminates in a horny pointed process.

Two species of this genus are found in England, the common cockchafer (*Melolontha vulgaris*, Fab.), of which there is a figure in the article COLEOPTERA, and the *Melolontha fullo*, a large species nearly an inch and a half in length, and which is of a blackish-brown colour, with irregular white markings. This beautiful insect is common in some parts of the Continent, but rare in this country, and has been found chiefly in the neighbourhood of Deal.

The genus *Rhizotrogus* differs from Melolontha chiefly in having but three lamellated joints to the antennæ, which are nine-jointed.

Rhizotrogus solstitialis, an insect which makes its appearance in the month of June, and often occurs in great abundance in some parts of this country: it very closely resembles the common cockchafer, but is of a smaller size, narrower form, and paler colour.

In the species of Rhizotrogus, as in Melolontha, the claws of the tarsi are furnished with a spine on the under side at their base; but in the next genus, *Serica*, the claws of all the tarsi are divided at the apex; the body is of a convex, ovate form, generally has a silk-like appearance, and changes in hue according with a change in the direction of the light.

Serica brunnea, a common insect in England, as well as in various parts of the Continent, is about three-eighths of an inch in length, and of a uniform pale-brown colour: the elytra are rather deeply striated, and, as well as the thorax, thickly punctured.

Serica Ruricola, another British species of the present genus, is of a black colour; the elytra are reddish-brown, and have the suture and outer margin black. This is a smaller insect than the last (being about three-twelfths of an inch in length), and of a shorter and more rounded form: it also differs in having the palpi obtusely terminated, and not acute, as in *S. brunnea*. This difference in the form of the palpi is considered by many authors of sufficient importance to separate the two insects generically, and by these authors the *S. Ruricola* is placed in the genus *Omaloplia*.

The genus *Serica* is found in all the quarters of the globe; and in M. Dejean's 'Catalogue des Coléoptères' there are sixty species enumerated.

In addition to the foregoing three groups, which appear to constitute the more typical *Melolonthidæ*, Latreille places in this family the following six genera:—

1. *Dasyus* (Lepel. et Serv.). This genus contains but few species, and appears to be confined to Brazil: they have the claws of the two anterior tarsi bifid, and those of the other tarsi entire.

2. *Macrodactylus* (Latreille). In this genus all the joints of the tarsi are alike in both sexes, and all the claws are bifid. The legs are very long, and the body is of an elongated and slender form: the thorax is narrower than the elytra, and is contracted both anteriorly and posteriorly.

Macrodactylus subspinosus, a common insect in some parts of North America, is about three-eighths of an inch in length; the head and thorax are black, but covered with minute yellow scales; the elytra are of a yellowish-brown colour, also covered with yellow scales: the under parts of the body are nearly white, owing to the dense clothing of scales with which they are furnished; the legs are deep-yellow, and the tarsi are black. About seven other species of the present genus are known, nearly all of which inhabit South America.

3. *Diphucephala* (Dejean). The species of this genus are confined to Australia. [DIPHUCEPHALA.]

4. *Plectris* (Lepel. et Serv.). The claws of the intermediate tarsi unequal in size; the larger of these two pairs of claws are bifid, and all the claws of the remaining tarsi are also bifid. Twelve species are known: they inhabit Brazil.

5. *Ceraspis* (Lepel. et Serv.). The species of this genus, all of which inhabit Brazil, may be distinguished by having two small notches near the middle of the hinder margin of the thorax; the space between the notches is received into a notch in the scutellum. The antennæ are 10-jointed: the claws of all the tarsi, with the exception of the anterior pair, are unequal; the larger claw of the intermediate tarsi is entire in the male sex, the other claws are bifid. In the females all the claws are bifid. The body is covered with minute scales, and is of an elongated form.

6. *Areoda* (Leach). Antennæ 10-jointed; sternum produced anteriorly; the claws of the tarsi unequal in the male sex, and equal in the females. The larger claws of the males

are bifid. The basal joints of the tarsi are short, and the terminal joint is very large, and grooved beneath. These insects are of large size, and adorned with brilliant colours. In the form of the sternum, and structure of the tarsi and claws, they depart from the true Melolonthidæ, and evince an affinity to the *Rutelidæ* and *Anoplognathi*, where, as in the present genus, the species have the power of folding the claws backwards against the under side of the terminal joint of the tarsus (like the closing of the blade of a pen-knife); and when thus closed, the point of the larger claws is lodged between the penultimate and antepenultimate joints of the tarsi.

Areoda lanigera, a common species in some parts of North America, is rather more than three-fourths of an inch in length, of an oval form and pale yellow colour, with green reflections: the under parts of the body are of a dark green colour, and thickly furnished with white hairs.

There are six other known species of this genus: one is found in Guadaloupe, and the remainder inhabit South America.

MELON (*Cúcumis Melo*) is an herbaceous, succulent, climbing or trailing annual, cultivated for its fruit in hot Eastern countries from time immemorial. In regions where most cooling vegetables disappear on the approach of great summer heat and drought, the melon, together with the water-melon, become essential substitutes. The antiquity of the cultivation of melons being so remote, and their dispersion over large portions of Asia and Africa so extensive, their indigenous locality cannot be traced at the present day. The originals of the varieties called Cantaloup, from a place of that name about 15 miles from Rome, where melons have been cultivated since the time of the Mithridatic war, are said to have been brought from Armenia by Lucullus. In that country and Persia, melons are well known to be extremely plentiful; and their cultivation, in the open air, is supposed nowhere to equal that which is practised in the plains of Ispahan and in Bokhara. The soil is there manured with pigeons' dung. But the varieties cultivated at and near Ispahan differ very much from the Cantaloups, which have hitherto been preferred for European culture. The Persian varieties are adapted to circumstances of soil and climate which it seems impossible to imitate artificially; for the skill of the horticulturist has been exerted in vain in attempting to produce fruit of these varieties in full perfection with regard to flavour and size.

If the roots be favourably situated, so far as moisture is concerned, the melon will bear a tropical heat; and, generally speaking, it will not succeed perfectly in the open air beyond the 43rd parallel of latitude. Its range of atmospheric temperature may be estimated at between 70° and 80°. The medium in which the roots are placed should of course be more uniform, and about 75° of bottom heat will be found both safe and efficacious.

The soil should be a fresh strong loam, not too adhesive. The topsoil of rich alluvial pasture-ground is found to answer the purpose exceedingly well, particularly where it has been overflowed in winter. If dung be used, it should be well rotted and intimately mixed with the soil; and it must not be used in such quantity as to occasion a too luxuriant growth of foliage, which in this climate would cause the fruit to be deficient in flavour.

Light is so essential, that unless the plants are kept near the glass, no tolerable degree of flavour will be acquired. As much of the direct rays of the sun should be admitted as the plants will endure, more especially when the fruit is approaching maturity. A screen may be occasionally necessary, but it should be of very thin texture.

If melon plants were not adapted for a dry atmosphere, during a considerable portion of the day at least, they could not exist in the parching climates in which they naturally grow; and therefore a free admission of air is to be recommended, so far as is consistent with the maintenance of a high temperature. The health of the plant soon suffers if evaporation by the foliage is not freely carried on; for it is found that when it is obstructed by continued moist foggy weather, disease commences, and mildew ensues. The regulation of moisture in the artificial atmosphere in which melons are grown, under an English sky, is, of all others, the most insurmountable difficulty. Covering the soil with slates or tiles or with clean gravel has been successfully resorted to as a mode of preventing the air in the frame from being at all times saturated with moisture exhaled from the soil.

Melons will thrive if their roots are actually allowed to extend themselves in water; and in the case of the floating-beds on which they are grown in some parts of Persia, they find their way through the mould and its support into the water. But a drier medium for the roots becomes essential for good flavour in the comparatively close mode which in forcing them it is necessary to adopt in this country, in order to prevent the dissipation of heat, which would otherwise take place from a limited atmosphere the temperature and elasticity of which are so much above that by which it is surrounded.

About four months may be allowed, on an average, for the period between the sowing of melons and the ripening of the fruit. The middle of January is found to be early enough to sow; and the young plants are so exceedingly tender, that accidents are then very likely to occur to them. It is on this account necessary to make successive sowings, in order to be prepared for replacement, if requisite, and also for continuing the supply throughout the summer. A sowing for the latest crops will require to be made in April. Melons may be grown by means of frames on hot-beds [HOT-BED], or in pits heated according to some of the various modes of hot-water application now so generally adopted. The seeds are sown in pans, or in small pots, and transplanted into other small pots when their seed-leaves are about half an inch broad. It is best to put only a single transplanted melon into each pot. While this is done in a separate frame, that which is intended for their future growth and fruiting is prepared for their reception, by placing small hills, rather more than a foot high, of light rich mould below each sash, and nearer to the back of the frame than the front. Care must be taken that this mould be of the proper temperature before the young plants are introduced, which is to take place when they have made a few rough leaves. As the roots extend, more soil should be added of a gradually stronger nature; and ultimately the roots should have a depth of about 15 inches of such soil. The soil should never be introduced in a cold state; and if there be no means for previously bringing it to the temperature of at least 70°, it should be put into the frame in small quantities. When water is required, it should never be much below the above-mentioned temperature, nor should it exceed 78°. It should not be applied when the air of the frame is at a high temperature from sun-heat. Shading is necessary immediately after watering, when the sun's rays have any great degree of power; unless this precaution is attended to, scorching will be induced, and the red spider will be likely to attack the foliage.

With regard to pruning and training the *runners* or *vines* of melon plants, it is necessary that a sufficient number of these for filling the frame should be made to ramify as close to the base of the main stem as can be conveniently effected by pinching off the top of the latter when it has made a few joints, or four leaves above the cotyledons; and the laterals, which in consequence become developed, may be again subdivided by a similar process. Blossoms of a monœcious character will soon after make their appearance. The male blossoms, or at least a portion of them, must be retained for the purpose of fertilisation till the requisite quantity of fruit is fairly set, after which those shoots which have only male blossoms may be dispensed with, in order to afford more space for the foliage connected with the fruit. The extremities of the fruit-bearing vines are stopped by pinching at the second or third joint above the fruit. The vines must afterwards be kept regulated so as not to overcrowd the frame with more foliage than can be duly exposed to the light. The regulation should be early and frequently attended to, so as not to have occasion to remove many vines from the plant, or divest it of much foliage at any one time. A piece of slate or tile is placed under each fruit for the purpose of keeping it from the damp soil. The heat must be fully maintained, or even considerably increased, as the fruit approaches maturity, in order to allow the admission of a more free circulation of air; but if at the same time the bottom heat be allowed to decline, the plants will become diseased and fall a prey to the mildew or to the red spider.

It has been observed that the Persian melons differ from those generally cultivated in Europe; the best account of them is in the sixth volume of the 'Transactions of the Horticultural Society.' It is there stated that 'they are found to require a very high temperature, a dry atmosphere, and an extremely humid soil. In that country we are told

that the melon is grown in open fields, intersected in every direction by small streams, between which lie elevated beds richly manured with pigeons' dung. Upon these beds the melons are planted.' It is further observed that 'the Persian gardener has therefore to guard against nothing but scarcity of water; the rest is provided for by his own favourable climate. With us the atmosphere, the ventilation, the water, and the heat are all artificial agents operating in opposition to each other.' From what has been experienced it seems in vain to attempt to bring those fruits to that delicious perfection here which they are known to acquire in their native country, except at the most favourable period of our season; for if this be chosen the two greatest essentials for producing flavour, a copious ventilation and high temperature, may be frequently combined without the latter being at the same time much counteracted by the former.

The varieties of melons can scarcely be kept permanent, particularly where many are cultivated, as they hybridise so readily. One of the finest, and perhaps the best of all, is the Beechwood melon. The Early Cantaloup, Windsor Scarlet Fleshed, Cephalonian, Green Fleshed Egyptian, Green Fleshed Italian, Early Polignac, and Golden Rock, are esteemed excellent. Of the Persian varieties the Green Hoosainee, Striped Hoosainee, and the large Germek are considered the hardiest; and the Melon of Keiseng, Melon of Nukshevan, Sweet Melon of Ispahan, and the Geree Melon are the highest flavoured. The Dampsha is a winter melon, or one of those varieties which are cultivated in the East, and have the property of keeping for a long time after being cut.

(*Guide to the Orchard and Kitchen Garden; Transactions of Hort. Soc.;* Loudon, *Encyclopædia of Gardening.*)

MELO'NIA. [FORAMINIFERA, vol. x., p. 349, where the name of the genus is erroneously printed *Melonis.*]

MELO'PHUS, Mr. Swainson's name for a subgenus of *Leptonyx* (Sw.). The subgenus is thus characterised:—

General structure of *Fringillaria*, but the upper mandible is notched near its tip. Hinder claw lengthened, but rather shorter than its toe. Lateral *toes* equal. *Tail* even. *Head* crested. Tertials not lengthened. (Sw.)

Example. *M. erythropterus.* ('Ill. of Orn.,' pl. 132.) [FRINGILLIDÆ, vol. x., p. 483.]

MELOS. [MILO.]

MELPO'MENE. [MUSES.]

MELROSE. [ROXBURGHSHIRE.]

MELTON MOWBRAY. [LEICESTERSHIRE.]

MELUN, a town in France, capital of the department of Seine et Marne, situated on the Seine, 24 miles in a direct line south-east of Paris, or 28 miles by the road.

Cæsar, who mentions the place in his 'Commentaries' by the name Melodunum, and perhaps Metiosedum, describes it as being 'a town of the Senones, situated in an island of the Sequana (Seine), in the same manner as Lutetia (Paris).' (*B. G.*, lib. vii., c. 58.) It was taken by Labienus, Cæsar's legatus, in his campaign against the Parisii. (*Ibid.*) It was a place of note in the earlier times of the French monarchy, and was repeatedly taken by the Northmen or the English. It was taken, after an obstinate resistance by the governor Barbazan, by the English under Henry V. (A.D. 1419 or 1420); but in 1435 the inhabitants drove them out and admitted the troops of Charles VII.

The town is for the most part built on a slope on the right bank of the Seine, and, from the advantage of its situation, presents a good appearance, though neither well laid out nor well built. It has a large circular place, and two insignificant promenades. Of its two churches, that of St. Aspaïs is distinguished by some handsome stained-glass windows. The prefect's residence was formerly a Benedictine abbey, and there are the ruins of an old castle on the island, in which the Celtic town stood. The population in 1831 was 6604 for the town, or 6622 for the whole commune; in 1836 it was 6846. The chief manufactures are cotton yarn, printed cottons and other cotton goods, woollen cloths, druggets and serges, leather, window-glass, and earthenware. There are flour and tan mills, and lime and plaster kilns. Trade is carried on in corn, flour, wine, cheese, wool, and cattle: there is a well-frequented market for corn intended for the supply of Paris. There is much meadow-land round the town. There are a prison or house of correction, a barrack for cavalry, and a theatre; a high school, a free drawing-school, &c.

The arrondissement of Melun has an area of 390 square miles: the population in 1831 was 57,697; in 1836, 57,821 it is divided into six cantons or districts, each under a justice of the peace, and comprehends 105 communes.

MELVILL, or MALEVILL, GEOFFREY DE, of Melville Castle, in the shire of Edinburgh, first appears in the records about the middle of the twelfth century, when he is designated by King Malcolm IV., 'Vicecomes meus de castello puellarum,' that is to say, sheriff of Edinburgh. There was then no sheriff of the shire of Edinburgh; none had yet been constituted, nor for some time afterwards; and the public business was in all likelihood principally transacted in the castle, of which he was said to be sheriff.

In the same reign and forwards to the year 1171, Melville was lord-justiciar of 'Scotland,' then strictly so called, or the territory of the king of Scots north of the Frith of Forth; the district south of the Forth (once a part of Northumberland) long continuing a distinct territory under the name of 'Lothian,' and having its own separate justiciar. Melville is the earliest justiciar of Scotland yet discovered in our records. The time of his death is uncertain. He had a younger son Philip, who by his marriage obtained the barony of Monethyn in the Mearns. Philip de Malevill, the son of the said Philip, was sheriff of the Mearns about the year 1200. In 1222 he was made sheriff of Aberdeen; and in 1240 a joint-justiciar of Scotland with Richard de Montalt.

MELVILLE, SIR JAMES, is supposed to have been born in the year 1535. He was the third son of Sir John Melville of Raith, one who early joined the party of the Reformation in Scotland, and after suffering from the animosity of Cardinal Beaton, at length fell a victim to his successor, Archbishop Hamilton, in 1549. Young Melville, then about 14 years old, was upon this, it seems, sent by the queen dowager's influence and direction, and under the protection of the French ambassador returning to France, to be a page of honour to the youthful Mary, queen of Scotland. He appears however to have rather continued in the ambassador's employ till 1553, when he got into the service of the constable of France. He afterwards made a visit to the court of the Elector Palatine, and being well received, remained there for some time, but ultimately came to Scotland. It would be a profitless task to follow the knight in all his missions and movements. He was a courtier in the strict sense of that term, one to whom a court was the whole world, and its principles of action the great code of duty. He appears to have had a high idea of his own importance, and sometimes blames himself for the unfortunate temper, which he says he possessed, of finding fault with the proceedings of the great. All this and much more we learn from the elaborate memoirs of his own life and times, which he was careful to write for the benefit of posterity. Two mutilated editions of this curious work were published in English, besides a French translation, but an accurate edition has been recently published from the original manuscript. Sir James died on the 1st November, 1607.

MELVILLE, ANDREW, was born on the 1st August, 1545. He was the youngest of nine sons, children of Richard Melville of Baldovy, a small estate on the banks of the South Esk, near Montrose; and he had the misfortune to lose both his parents when only about two years old, his father falling at the battle of Pinkie in 1547, and his mother dying in the course of the same year. The care of young Melville devolved upon his eldest brother, who was minister of the neighbouring parish of Maritoun after the establishment of the Reformation in 1560. The year preceding this, Melville, then at the age of fourteen, was removed from the grammar-school of Montrose, where he had been for some time, to St. Mary's College, in the university of St. Andrew's. This place he left in 1564, with considerable reputation for his proficiency in philosophy and the languages, and repairing to the Continent, entered himself a student in the university of Paris, where he remained two years, when, in order to acquire a more perfect knowledge of the civil law, he proceeded to Poictiers. He had scarcely arrived there when, such was the opinion entertained of him, that though a stranger and only twenty-one years of age, he was made a regent in the college of St. Marceon. He continued in this situation for three years, prosecuting at the same time the study of the law, when, on account of the political disturbances of the place, he retired to Geneva, and was there, by the influence of Beza, appointed to the

chair of humanity in the Academy, which happened to be then vacant. When he received this appointment he was, as to pecuniary means, in a state of almost total destitution. Leaving his books and other effects behind him, he had set out on his journey to Geneva on foot along with a young Frenchman, who wished to accompany him, and on reaching their destination the joint fund of the two travellers did not exceed a crown. The quarter's salary, which was advanced to Melville at his admission to the chair, proved accordingly a most seasonable relief. Geneva was a scene to which the mind of Melville often recurred in after-life. It was there he made that progress in Oriental learning for which he became so distinguished. There also he enjoyed the society of some of the best and most learned men of the age; but above all it was there the hallowed flame of civil and religious liberty began to glow in his breast, with a fervour which continued unabated ever after. He left Geneva in the spring of 1574, at the urgent request of his friends at home, and returned to his native country after an absence altogether of about ten years. On this occasion Beza addressed a letter to the General Assembly, in which, among other expressions of a like kind, he declared that Melville was 'equally distinguished for his piety and his erudition, and that the Church of Geneva could not give a stronger proof of affection to her sister church of Scotland than by suffering herself to be bereaved of him that his native country might be enriched with his gifts.'

It was about this time Melville seems to have made his first appearance as an author. His earliest publication consisted of a poetical paraphrase of the 'Song of Moses,' and a chapter of the Book of Job, with several smaller poems, all in Latin, and worthy of the disciple of Buchanan,* especially his 'Carmen Mosis.'

On Melville's arrival in Edinburgh, in July, 1574, he was invited by the regent Morton to enter his family as a domestic tutor; but this invitation was declined by Melville, who was averse to a residence at court, and preferred an academic life. He was early gratified in this wish; for shortly afterwards he was appointed by the General Assembly Principal of Glasgow College. Here his learning, energy, and talents were eminently serviceable, not only to the university over which he presided, but to the whole kingdom and to literature in general. He introduced improvements in teaching and discipline, of great importance, and infused an uncommon ardour into his pupils. His very table-talk and conversation were so interesting and instructive that the master of the grammar-school, who was afterwards principal of the college, used to say 'he learned more of Mr. Andrew Melville, cracking and playing, for understanding of the authors which he taught in the school, than by all his commentators.' It was not however as a mere scholar or academician that Melville was distinguished. He took a prominent part in the ecclesiastical disputes of the time, and was active in the church courts and in the conferences held with the parliament and privy-council on the then much agitated subject of church government. To him is generally ascribed the overthrow of episcopacy at that time and the establishment of presbytery, and he commonly went afterwards by the name of Episcopomastix, or the Scourge of bishops. His intrepidity was often very remarkable. On one occasion, when threatened by the regent Morton in a menacing way, which few who were acquainted with his temper could bear without apprehension, Melville replied, 'Tush, man! threaten your courtiers so. It is the same to me whether I rot in the air or in the ground; and I have lived out of your country as well as in it. Let God be praised; you can neither hang nor exile his truth!'

Another matter to which the attention of the General Assembly was at this time directed was the reformation and improvement of the universities. Here Melville also took a leading part. At the end of the year 1580 he was translated from Glasgow to be principal of St. Mary's College in the university of St. Andrew's, where he distinguished himself by his usual zeal and ability. Besides giving lectures on theology, he taught the Hebrew, Chaldee, Syriac, and Rabbinical languages, and his prelections were attended not only by young students in unusual numbers, but also by several masters of the other colleges. In these scholastic labours however he did not lose sight of the condition of the Church, and being called on to open an extraordinary meeting of the General Assembly in 1582, he inveighed in his sermon in strong terms against the arbitrary and oppressive measures of the court. His boldness gave offence to the regent, and shortly afterwards he was cited before the privy-council on a charge of high-treason founded on some expressions which it was alleged he had made use of in the pulpit. The charge was not proved; but being determined to silence him, the privy-council found him guilty of behaving irreverently before them, and sentenced him to imprisonment, and to be further punished in his person and goods as his majesty should see fit. Fearing his death was ultimately intended, he was urged by his friends to make his escape, and accordingly leaving Edinburgh he went first to Berwick and then to London, where he remained till about the end of the year 1585, when the indignation of the kingdom having driven Arran from the court, Melville returned to Scotland after an absence of about twenty months, and resumed his former station in the university. His sincerity and zeal however were by no means agreeable to the king, who wished to assume an absolute control over the affairs of the Church; and in order to accomplish his wish to get rid of him, the king had recourse to one of those stratagems which James thought the essence of 'king-craft.'

In May, 1606, after the king had ascended the English throne, Melville received a letter from his majesty desiring him to repair to London that his majesty might consult him and others of his learned brethren on ecclesiastical matters. Melville and others went accordingly, and had various interviews with the king, who at times condescended even to be jocular with them; but they soon learned that they were interdicted from leaving the place without special permission from his majesty. Melville having written a short Latin epigram, in which he expressed his feelings of contempt and indignation at some rites of the English church on the festival of St. Michael, was immediately summoned before the privy-council, found guilty of *scandalum magnatum*, and, after a confinement of nearly twelve months, first in the house of the dean of St. Paul's, and afterwards in that of the bishop of Winchester, was committed to the Tower. Here he was kept a prisoner till the month of February, 1611, a period of about four years, when, at the solicitation of the duke of Bouillon, who wished his services as a professor in the university of Sedan, he was permitted to depart the kingdom.

In 1620 his health, which had previously been slightly impaired, grew worse, and in the course of the year 1622 he died at Sedan, in the seventy-seventh year of his age, but under what circumstances is not accurately known.

Melville appears to have been low in stature and slender in his person, but possessed of a sound constitution and great physical energy. His voice was strong, his gesture vehement, and he had much force and fluency of language, with great ardour of mind and constancy of purpose. His natural talents were of a superior order; and, in the concluding words of his biographer, 'next to the Reformer I know no individual from whom Scotland has received such important services, or to whom she continues to owe so deep a debt of national respect and gratitude as Andrew Melville.' (M'Crie's *Life of Melville.*)

MEMBRANE (in Anatomy) is an expansion of any tissue in a thin and wide layer. Since the time of Bichat [BICHAT], the membranes have been generally enumerated as of three kinds, the serous, the mucous, and the fibrous, which are distinguished as well by their physical characters and their functions, as by the diseases to which each is peculiarly subject.

The serous membranes are so named from the character of their secretion, which consists of a very small quantity of thin serous fluid. In the adult condition of man and the higher vertebrata, they form what are called shut sacs. In each of the cavities of the chest, for example, which are exactly filled by the lungs, there is a serous membrane, the pleura, which lines the walls of the chest, and is then reflected on and covers the surface of the lung; and thus there is enclosed between the surface of that part which lines the chest, and of that which envelopes the lung, an extremely narrow space, a sac, into which a very small quantity of fluid is secreted. During respiration there is a constant friction between the lung and the walls of the chest, which the fluid, by its lubrication of their surfaces, renders easy. It is the general condition of serous membranes, that they exist, with the single exception of the conjunctiva of the eye [EYE], wherever there is friction between the

* In a copy of verses addressed to Buchanan, Melville calls him his master: 'Andreas Melvinus Geo. Buchanano preceptori suo et Musarum parenti.' To what period this alludes however, we have no precise information.

surface of an organ and the cavity in which it is contained. They are adapted for this condition by possessing a remarkably smooth polished surface, covered by a very fine layer of epithelium, through which their moistening secretion can easily pass. The basis of their structure is a fine and rather loose cellular tissue, which by boiling is at once converted into gelatine. The serous membranes in man are, the arachnoid, which is found in the cerebro-spinal cavity [BRAIN], lining the dura mater, and covering the brain and spinal chord, and lining the ventricles; the pleuræ, lining the chest and covering the lungs [RESPIRATION]; the pericardial serous membrane, similarly related to the heart and its investing sac [HEART]; the peritoneum, lining the abdominal walls and covering the abdominal part of the digestive canal, the liver, spleen, part of the pancreas, &c.; and the tunica vaginalis, forming the sac of the testis.

The synovial membranes, by which joints are lined, and the heads of bones which move on each other covered, may be regarded as a modification of serous membranes, differing from them chiefly in the character of their secretion and in some of their diseases. [ARTICULATION.]

A membrane very similar to the serous lines the whole vascular system, and forms the internal membrane of the arteries, veins, lymphatics, and lacteals, forming a closed cavity with innumerable ramifications, and affording, with its polished surface and fine epithelium, the least possible obstacle to the movement of the circulating fluids.

The mucous membranes, like the serous, are named from their peculiar secretion. [MUCUS.] While the serous membranes line all those cavities whose surfaces are in contact with living parts, the mucous membranes line those canals and cavities which, in the adult condition of man and the higher vertebrata, are exposed to the contact of the air and other inorganic substances. The basis of these membranes is a compact cellular tissue, which does not yield gelatine in boiling, and whose areolæ do not contain fat. Their epithelium is thicker than that which covers serous membranes, but thinner then the epidermis covering the skin, to which they are in many respects similar. In the parts where they line the organs of sense, the mucous membranes are generally beset with fine nervous papillæ; in other parts, numerous glands for peculiar secretions open on their surface by orifices through which the membrane is continued up the branches of the ducts into the very substance of the gland. [GLAND.] Nearly all the tracts of mucous membrane in man communicate with each other: they are, the nasal, which lines the cavities of the nose; the conjunctival, which covers the front of the eye-ball and lines the eye-lids, and opens by the lacrymal duct into the nose [EYE; LACHRYMAL GLAND]; the auditory, which lines the cavities of the ear [EAR] and opens into the pharynx; the digestive, including that which lines the mouth, œsophagus, stomach, intestines, and the several glands whose ducts open into this canal; the respiratory, which lines the larynx, trachea, and bronchial tubes [RESPIRATION]; the urogenital; and the mammary.

The fibrous membranes are those which are chiefly formed of tendinous tissue. They serve either to form strong cavities for the protection of important parts, as the pericardium, the dura mater, the fibrous capsules of joints, the sheaths of tendons, &c., or to envelop and strengthen certain parts, as the periosteum, fasciæ, &c.; or they are merely expanded tendons, as aponeuroses. They are tough and inelastic membranes, composed of the shining dense wavy fibres which constitute the usual structure of tendons, mixed with more or less of a dense cellular gelatinous tissue.

MEMBRANI'PORA. [POLYPIARIA MEMBRANACEA.]

MEMECYLA'CEÆ are a very small natural order of Polypetalous Exogens, consisting of a few tropical plants of little interest. Most of them inhabit the East Indies, the Isle of France, and Madagascar. They are in habit and foliage like Myrtaceæ, with which order they agree in most respects; but they have anthers which in form resemble those of many Melastomaceæ, and the leaves have no transparent dots. From the latter order they are distinguished by their leaves not being ribbed, and by their cotyledons being convolute. In the opinion of Brown and Chamisso, it is rather as a section of Melastomaceæ than as a peculiar order that Memecylaceæ are to be accounted. No useful properties have been assigned to any of the species, except to Memecylon edule, an East Indian plant, whose leaves are an ingredient in the dyes of Coromandel, according to Roxburgh, and whose ripe astringent pulpy black berries are eaten by the natives.



1, Mouriria guayanensis; 2, a full-blown flower, 3, a stamen, with the anther opening by pores at the upper end; 4, a transverse section of a ripe fruit, copied from a figure by Turpin.

MEMEL, River. [NIEMEN.]

MEMEL (called Klaipeda by the Lithuanians), the capital of the circle of the same name, in the government of Königsberg, in East Prussia, is situated in 55° 42′ N. lat. and 21° 5′ E. long. It is the most northern town in the Prussian dominions; and being only 13 miles from the frontiers of Russia, has long been the centre of a very extensive contraband trade with that empire, which has however been extremely restricted by the very rigorous measures employed by the Russian government. It is situated at the mouth of the little river Dange (pronounced Danie), near the Kurisches Haff, which is connected by a narrow channel with the Baltic. The harbour, which is good and safe, is defended by the citadel. Before it there is a lighthouse, 73 feet high, on a sand-hill. Memel is extremely well situated for commerce; and the number of ships that annually visit it may be taken at 700 on an average, of which at least two-thirds are British. The principal articles of exportation are:—timber, which is brought down in floats; hemp, flax, corn, hides, tallow, bristles, wax, feathers, and yarn. The imports are chiefly colonial produce and calicoes. There are breweries, distilleries, soap-manufactories, and saw-mills. The town was formerly well fortified; but only a part of the works now remain, and no use is made of them. There are several public offices and public schools; the churches are four in number, viz. one German Lutheran, one Lithuanian Lutheran, one Roman Catholic, and one Calvinist. None of the public buildings are remarkable. The town is however on the whole regularly built. The population, by the census of 1837, was 9034. Memel is likewise the German name of the river Niemen.

(A. G. Preuss, *Beschreibung von Preussen*, 8vo., 1835; Stein; Horschelmann.)

MEMINNA, a genus of the subfamily *Moschina* (Gray). [MOSCHIDÆ.]

MEMNON, a personage frequently mentioned by Greek writers. He is first spoken of in the 'Odyssey,' as the son of Eos, or the morning, as a hero remarkable for his beauty, and as the vanquisher of Antilochus. (iv. 188; xi. 521.) Hesiod calls him the king of the Ethiopians, and represents him as the son of Tithonus. (*Th.*, 985.) He is supposed to have fought against the Greeks in the Trojan war, and to have been killed by Achilles. In the *Ψυχοστασία*, a lost drama of Æschylus, the dead body of Memnon is carried away by his mother Eos. (*Fragm.*, No. 261, Dindorf.) He is represented by most Greek writers as king of the Ethiopians, but he is also said to have been connected with Persia. According to Diodorus (ii. 22), Tithonus, the father of Memnon, governed Persia at the time of the Trojan war, as the viceroy of Teutamus, the Assyrian king; and Memnon erected, at Susa, the palace which was afterwards

known by the name of Memnonium. Diodorus also adds that the Ethiopians claimed Memnon as a native of their country. Pausanias combines the two accounts: he represents Memnon as king of the Ethiopians, but also says that he came to Troy from Susa, and not from Ethiopia, subduing all the nations in his way. (Paus., x. 31, § 6; i. 42, § 2.) Æschylus also, according to Strabo, spoke of the Cissian, that is, Susian, parentage of Memnon (xv., p. 720); and Herodotus mentions the palace at Susa, called Memnonia, and also says that the city itself was sometimes described under the same name. (Herod., v. 53, 54; vii. 151.)

The great majority of Greek writers agree in tracing the origin of Memnon to Egypt or Ethiopia in Africa; and it is not improbable that the name of Memnon was not known in Susa till after the Persian conquest of Egypt, and that the buildings there called Memnonian by the Greeks were, in name at least, the representative of those in Egypt. (British Museum, *Egyptian Antiquities*, i., p. 267.) The partial deciphering of the Egyptian proper names affords us sufficient reason for believing, with Pausanias (i. 42, § 2), that the Memnon of the Greeks may be identified with the Egyptian Phamenoph, Phamenoth, Amenophis, or Amenothph; of which name the Greek is probably only a corruption. Phamenoph is said to mean 'the guardian of the city of Ammon,' or 'devoted to Ammon,' 'belonging to Ammon.'

Memnon then must be regarded as one of the early heroes or kings of Egypt, whose fame reached Greece in very early times. In the eighteenth dynasty of Manethon the name of Amenophis occurs, with this remark:—'This is he who is supposed to be the Memnon and the vocal stone.' He is Amenophis II., and the son of Thutmosis, who is said to have driven the shepherds out of Egypt.

There are many colossal statues in Egypt, which have been called Memnonian, of which the most celebrated is the vocal statue described by Strabo and Pausanias. At sunrise a sound was said to proceed from this statue, which Pausanias compares to the snapping of a harp or lute [illegible], § 3). Strabo states that he heard the sound himself, in company with Ælius Gallus (p. 816); and Tacitus relates that Germanicus also heard the sound. (*Ann.*, ii. 61.) This statue is identified, by the descriptions of Strabo and Pausanias, with the northernmost of the two colossal statues in the Theban plain, on the west bank of the Nile. Its height, according to modern travellers, is about 50 feet; and its legs contain numerous inscriptions in Latin and Greek, commemorating the names of those who had heard the sound. Most of these inscriptions belong to the period of the early Roman emperors. There is some difficulty however, notwithstanding these inscriptions, in identifying this statue with the one described by Strabo and Pausanias. These writers say that the upper part had in their time fallen down; but at present the upper part exists in its proper position, though not in a single piece. Heeren conjectures that the broken statue might have been repaired after the time of Strabo. With respect to the sounds supposed to come from this statue, it is conjectured that they were caused by some trickery of the priests. 'Alexander Humboldt speaks of certain sounds that are heard to proceed from the rocks on the banks of the Oronoko at sunrise, which he attributed to *confined air* making its escape from crevices or caverns, where the difference of the internal and external temperature is considerable. The French *savans* attest to having heard such sounds at Carnak, on the east bank of the Nile; and hence it is conjectured that the priests, who had observed this phenomenon, took advantage of their knowledge, and contrived, by what means we know not, to make people believe that a similar sound proceeded from the colossal statues.' (British Museum, *Egyptian Antiquities*, vol i., p. 266.)

The head of the colossal Memnon in the British Museum has no claim to be considered as the vocal Memnon described by Strabo, Tacitus, and Pausanias. The height of the figure to which the head belongs was about 24 feet, when entire. There is also an entire colossal Memnon in the British Museum, 9 feet 6½ inches high, which is a copy of the great Memnon at Thebes.

(Hamilton's *Egyptiaca*; *British Museum*, 'Egyptian Antiquities;' *Philological Museum*, No. 4, art. 'Memnon.')

MEMNON of Rhodes, was the brother of the wife of Artabazus, the satrap of Lower Phrygia, and was advanced, together with his brother Mentor, to offices of great trust and power by Darius Ochus, king of Persia. We are ignorant of the time of Memnon's birth, but he is mentioned by Demosthenes as a young man in B.C. 352. (*Aristocrat.*, p. 672.)

Memnon possessed great military talents, and was entrusted by Darius, the last king of Persia, on the invasion of Asia by Alexander of Macedon, with an extensive command in western Asia; but his plans were thwarted and opposed by the satraps, and it was contrary to his advice that the Persians offered battle to the Macedonians at the Granicus. After the defeat of the Persians at the Granicus, Memnon was appointed to the chief command in western Asia, as the only general who was able to oppose the Macedonians. He first retired to Miletus, and afterwards withdrew to Halicarnassus in Caria, which he defended against Alexander, and only abandoned at last when it was no longer possible to hold out.

After the fall of Halicarnassus, Memnon entered into negotiations with the Lacedæmonians, with the view of attacking Macedonia. He was now completely master of the sea, and proceeded to subdue the islands in the Ægean. He took Chios, and obtained possession of the whole of Lesbos, with the exception of Mitylene, before which place he died, B.C. 333. The loss of Memnon was fatal to the Persian cause: if he had lived he would probably have invaded Macedonia, and thus have compelled Alexander to give up his prospects of Asiatic conquest, in order to defend his own dominions.

(Arrian; Diodorus Siculus; Quintus Curtius.)

MEMNON, a Greek historian of Heraclea in Bithynia, lived in the first or second century of the Christian æra. He wrote a history of the tyrants of his native town, of which considerable extracts have been preserved by Photius; these extracts have also been published separately. The best edition is by Orellius, Leip., 1816. They have also been translated into French by the Abbé Gédoyn, in the 'Mém. de l'Acad. des Inscriptions,' vol. xiv., p. 279-333. Photius was not acquainted with the first eight books of Memnon's History, nor with those which follow the sixteenth book. (Phot., c. 224.) The 'Excerpts' of Photius embrace a period from the assassination of Clearchus to the death of Brithagoras, which was at least later than 48 B.C.

MEMOIRS, a term, in its application to a particular species of writing, of French origin, and in appearance properly signifying, as its obvious etymology would denote, a narrative or account mainly or primarily intended for no higher purpose than that of simply recording the facts it embraces, or addressing the one faculty of the memory. Perhaps the modern memoirs may be held to answer pretty nearly to what the Romans understood by *Commentarii* or *Commentaria* (see the meanings of this word in Facciolati, *Lexic.*), unless when that title was given, in genuine or affected modesty, to writings of a more artificial character than that to which it rightly belonged. The philosophical ends, and the gratification of the imagination and the taste, aimed at in what is properly called a history, are not therefore to be looked for in memoirs, which, when they relate to historical subjects, are in truth not so much history as materials for history. A common description of French works of this kind is *Mémoires pour servir* (i.e. *à l'histoire*). Most frequently too, but not universally, memoirs detail events in which the writer himself has been personally concerned. Very often the work is purely biographical, and not historical at all; and sometimes materials for biography only, and not a biographical work in the proper sense of the term. Sometimes it is neither historical nor biographical, but merely a discourse or statement on some point in science or literature; of this kind are the published memoirs of many academies ('Mémoires de l'Académie des Inscriptions,' for instance), and other literary or scientific societies. It may be noted, that when Horace Walpole wrote his amusing account of the last ten years of the reign of George II., probably soon after the middle of the last century, the word 'Memoires,' which is the title he has given his work, was still so far from being completely naturalised among us, that he has retained the French spelling. At the same time, we have several English memoirs—such for instance as 'Memoires of the Reigne of King Charles I.,' by Sir Philip Warwick, 1701; 'Memoirs concerning the Affairs of Scotland,' by George Lockhart, Esq., 1714; 'Memoirs of John Ker, of Kersland,' by himself, 1726, &c. The French language is particularly rich in those kinds of historical and biographical materials which are expressed by the term Mémoires.

MEMORIAL. [ANNUITY.]

MEMORY is a name given to one of what are called the faculties of the mind,—the faculty (as it is otherwise expressed) of remembering or recollecting. The word is used to denote at the same time the operation or act of remembering, the state of the mind when it exercises the faculty, as distinguished from the faculty itself; but this last is a derived and by far the rarer use of the word.

What ideas are, how they are first generated, and how afterwards reproduced, are matters the explanation of which belongs to other articles. [IDEA; SENSATION; ASSOCIATION.] But when an idea is reproduced in the mind by any of the ordinary modes of association, and there co-exists with this idea the idea of its having been before present in the mind, this complex state of mind is a case of memory. We are then said to remember the thing (whatever it may be), the idea of which is thus present to the mind. This is an exercise of the faculty of memory.

Mr. Stewart seeks to make a distinction between the memory of events and the memory of things, on the ground that in the former case alone does the idea of past time form part of the complex state of mind. This does not seem to be correct. In all cases of memory, in the memory of things as well as of events, there is (as has been said) the idea of the idea which is now present to the mind having been present before. And this idea is obviously a complex idea, of which the idea of the previous time and the idea of the interval between that and the present time are parts. The particular idea of past time, by means of which Mr. Stewart seeks to make his distinction, belongs to the event that is remembered, and has evidently nothing to do with the mental phenomenon of memory. It is the idea of the event having taken place at a past time, and not (which alone is concerned with the mental phenomenon of memory) the idea of the idea of this event having been before present to the mind.

There is a distinction between *remembering* and *recollecting*, which, though not always observed in conversation, it is yet worth while to notice. The ideas that are remembered either come into the mind without any effort on the part of the person remembering, or with such effort. In the first case the person is more properly said to remember; in the second to recollect. The effort of recollection may be generally described as consisting in seeking out for different ideas which are likely to recall, by any of the ordinary modes of association, the desired idea. What these modes of association are has already been fully explained in two previous articles, ASSOCIATION and DREAMS.

It will be seen that the thing which is essential to the faculty of memory, and which distinguishes it from other faculties of the mind, that indeed which the faculty of memory may be said to be, is the faculty of recognising an idea which has before been present to the mind, as having been before present. But this faculty of recognition can never be exercised until the idea that is to be recognised has been introduced by one of the ordinary modes of association. Thus the principle or (as it may also be called) the faculty of association is necessary to the exercise of the faculty of memory. This principle of association, which, though necessary to the exercise of the faculty of memory, is yet only accidentally connected with that faculty, becomes consequently the basis of mnemonics, or the art of recollection.

The principle of all systems of mnemonics, however much these may differ in complexity, is the same, and simple. It is to select a number of objects which, whether of themselves or by reason of the order of selection, are more easily remembered than those which it is our object to remember, and to associate in our minds each one of the latter set with some one of the former. One of the simplest systems of mnemonics is the plan which used to be resorted to by the antient orators, of connecting in their minds the different parts of a speech with different parts of the building in which it was delivered. The different systems of *Memoria Technica* which have been put forth in later times are more complex specimens of the art. Of these, or of any one of these, it is unnecessary to give a detailed account here. One of the best known is that of Dr. Grey (Lond., 1730).

MEMPHIS. [EGYPT.]

MENA, JUAN, the best Castilian poet of the fifteenth century, was born about 1412 at Cordova, the 'alma ingeniorum parens,' as Nicolas Antonio calls it, on account of its numerous authors, especially Latin, Arabic, Hebrew, and Castilian poets. Although Mena did not show an ardent love of letters till he attained his twenty-third year, yet he so quickly and fully stored his mind, both in his native city and at Salamanca and Rome, that he was much courted by the elegant poet the Marquis of Santillana, Don Enrique de Villena, the constable Alvara de Luna, and the rhymesters who attended Juan II. This king appointed Mena his Latin secretary, and, what is more, his historiographer, a most honourable office, which was instituted by Alphonso X., 'el Sabio,' i.e. 'the Learned.' A fatal pleurisy stopped Mena's career in 1456 at Torrelaxuna, where his friend the Marquis of Santillana erected a sumptuous monument to his memory.

Mena's chief performance, 'El Laberinto,' or 'Las Trescientas (coplas),' is a didactic moral poem of the allegorical kind, but the scene is different from that of Dante, and it is unlike the work of the Italian poet also both in metrical form and style. It was published for the first time in 1496.

Quintana, a high authority (*Poesi. Selec. Introduc.*), dwells on it with little of his wonted severity. Southey, on the contrary, appears to forget the age in which the poem was written. The scenery, says he, and machinery, are despicable. He has however overlooked its most glowing passages, such as the patriotic end of the naval hero Conde de Niebla: he observes, 'There is no glimpse of imagination, and scarcely a trace of feeling' in it. Even the erudition of the commentator Fernan Nuñez, which must have been prodigious in his time, is mere schoolboys' learning, according to this critic. If Mena, coming 200 years after Berceo, is to be denied the title of the Spanish Ennius, it is much to be regretted that his more fortunate and immediate successors did not estimate his merit, and themselves imitate him in making new words and poetical forms or inflections, which are so congenial to inspiration and originality of thought, and so productive of deep impressions.

Mena also wrote some fugitive pieces; 'La Coronacion,' in honour of his patron and friend Santillana, and part of another moral allegory, '[illegible]ado de Vicios y Virtudes.' This latter was unsuccessfully continued by Gomez Maurique. Pero Guilen (styled 'el gran trobador,' probably of Segovia), and Jeronimo de Olivares, Knight of Alcántara. [illegible] 'La Cronica de Juan II.,' from 1420 to 1435. Some [illegible] memoirs on noble families of Castile ('Libro de Linages'), and a portion of the Iliad in Spanish, still in MS., are properly attributed to him. This is not the case however either with the first act or the whole of 'La Celestina, Tragi-Comedia de Calisto y Melibea,' which was begun by Rodrigo Cota, and continued in a different style by Fernan de Rojas; nor with the anonymous 'Coplas de Mingo Rebulgo' (a satirical eclogue against Enrique IV., not Juan II., as Bouterwek has hastily fancied); nor the commentary, which, as well as the text, belongs to Fernando del Pulgar, according to Mariana (year 1472 of his history) and the learned Sarmiento ('Obras Postumas'). The primitive sources for Mena's biography are, Bachiller Fernan Gomez de Cibda Real ('Centon Epistolario'), Valero Francisco Romero ('Epicedio à Hernan Nuñez'), and Sanctius Brocensius, the editor of the corrected edition of all his works, which Lucas Junta published at Salamanca in small 12mo. in 1582, and which was the foundation of a 25th, published in 1804 at Madrid, in small Spanish 8vo., by Repulles. This has not however the glosa, or comment, of Fernan Nuñez above mentioned, who is not to be confounded with the chronista Fernan Perez de Guzman.

MENAGE, GILLES, was born at Angers (where his father, a man of considerable learning and eloquence, held the office of *Avocat du Roi*), on the 23rd of August, 1613, as he has himself informed us in his 'Anti-Baillet,' chap. 71, where he inveighs with no small bitterness against the malignity of Baillet, who, in his 'Jugemens des Savans,' had made him more than three years older than he was, forgetting, observes Ménage, that the older I am, the more respect he owes me, and that Callistratus, the jurisconsult, on the fifth law of the Digest, 'De Jure Humanitatis,' has said, 'In our state, old age hath been at all times venerable; for our ancestors were wont to give to old men almost the same honour as to magistrates.' Ménage began life by practising as an advocate at Paris; but finding this profession not to suit his taste or his temper, he got himself made an abbé, which enabled him to hold some livings in the church without cure of souls. He then resided for a time in the family of Cardinal de Retz; but he finally established himself in a house of his own in the cloisters of Nôtre Dame, which soon became celebrated for the assemblies of men of letters, whom he continued to gather around him on

the Wednesday evening of every week to the end of his long life,—his *Mercuriales*, as he called them, from the Latin name for that day. A very considerable range of learning, an admirable memory, and some wit enabled Ménage, notwithstanding a pedantry which was often ridiculous, to maintain his position with sufficient éclat as the central figure of these réunions; and he also made some small profession of gallantry, both Madame La Fayette and Madame Sévigné having the honour of ranking him among their avowed admirers. These social enjoyments however did not prevent him from writing a great many books, which brought him a wide reputation, and were highly applauded in his own day by the general voice of the literary world, although the satiric and contemptuous style in which he was apt to indulge had not failed to make him a good many enemies; and one unfortunate performance in particular, his 'Requête des Dictionnaires,' published in ridicule of the Dictionary of the Academy, for ever shut against him the doors of that institution, or at least excluded him from a seat till he thought himself too old and infirm to accept one when he might have had it. (See the account he himself has given of this affair in his *Anti-Baillet*, chap. 82.) Of his numerous works, the following are the most important:—'Origines de la Langue Française,' 4to., Paris, 1650, afterwards enlarged and republished under the title of 'Dictionnaire Etymologique de la Langue Française,' folio, 1694, and 2 vols. folio, 1750; 'Poemata Latina, Gallica, Græca, et Italica,' 8vo., Par., 1658, and 12mo., Amstel., 1687; 'Observations sur la Langue Française,' 12mo., Par., 1672; 'Origini della Lingua Italiana,' folio, Genev., 1685; 'Anti-Baillet,' 8vo., Par., 1685, and, along with Baillet's 'Jugemens,' 4to., Amst., 1725; a valuable edition of Diogenes Laertius, with annotations; and some other editions of classical and other works. After his death, which took place in 1692, his friends published, under the title of 'Ménagiana,' a collection of his bon-mots and other [illegible] made in conversation, upon the value of which Bayle, in his Dictionary, has pronounced a very high eulogium, and which is still generally considered to be one of the best, if not the very best, of this class of works. It was originally published in two volumes, the first of which appeared in 1693, the second in 1694; but the best edition is the third, published in 1715, and enlarged by the additions of the learned editor, M. de la Monnoye, to four volumes.

MENAI BRIDGE, across the Menai Strait, where it connects Caernarvonshire with the Isle of Anglesey, at the rocky point called Ynys-y-Moch (or Pigs' Island), situated in the latter, is the finest Suspension Bridge hitherto erected, and a noble monument of the scientific skill of the late Thomas Telford. Formerly the passage between Anglesey and the opposite mainland was kept up by six ferries, the chief of which was called Bangor Ferry, from its proximity to that town; but a permanent connection, by means of a bridge, had been in contemplation, and various projects for one had been considered long before the present structure was undertaken. In 1785 a petition for such a bridge was presented to parliament, but the scheme advanced no further until after the union with Ireland, when it was deemed expedient to facilitate the intercourse between the two countries by forming a commodious route to Holyhead. Mr. Rennie, the engineer, was accordingly directed to make plans for the purpose in 1801, and four different designs were made by him, one of which was for a cast-iron arch of 450 feet span, and rising 150 feet above high-water mark. The measure was however postponed until 1810, when it was again resumed, and a committee of the House of Commons for the purpose appointed. Mr. Telford was then instructed to make a survey of the roads from Shrewsbury and Chester to Holyhead, and also to prepare designs for a bridge across the Menai Strait. He made two, adapted to two several points: one at the Swellies, where he proposed a bridge of three cast-iron arches, each 260 feet in span, with a stone arch between each two of them, 100 feet in span; the other at Ynys-y-Moch, with a single cast-iron arch 500 feet in span, to which latter he himself gave the preference. The subject excited much public attention, but great doubts were entertained of the practicability of the plan. In the meanwhile Telford published his design for Runcorn Bridge, with a centre opening 1000 feet wide, and two others of 500 feet each. Upon this he was directed by government to design one on a similar principle, that is, a suspension bridge, for the passage across the Menai.

The site fixed upon by him at Ynys-y-Moch was highly favourable, the opposite shores being bold and rocky, and allowing the roadway of the bridge to be 100 feet above high-water mark. The distance between the supporting pyramids or points of suspension was proposed to be 560 feet, the height of the pyramids 50 above the level of the roadway, the main chains to be 16 in number, with a deflection of 37 feet, their ends being secured in a mass of masonry built over stone arches between each of the supporting piers or pyramids and the adjoining shore, and these arches, four on the Anglesey and three on the Caernarvonshire side, being each 50 feet in span. The roadway is divided into two carriage ways, each 12 feet wide, with a footpath 4 feet wide between them.

The plan having been approved of by parliament, the sum of 2[illegible],000*l*. was voted to enable the commissioners to commence operations. Accordingly, in July, 1818, all the requisite preparatory steps were taken, labourers were engaged, workshops built, and the levelling for the foundations commenced, when such opposition was made to the scheme that the commissioners were obliged to apply to parliament for an act to confirm and amend their powers. Although this occasioned considerable delay, all the preparatory works continued to be proceeded with. The new bill received the royal assent, July 2, 1819, and the first stone was laid on the 10th August following. The three arches on the Caernarvonshire side were keyed in on January 18, February 27, and March 25, 1822; those on the Anglesey side, August 31, September 14, and October 3 and 24 of the same year. In March of the following year the iron-work for the attachment of the main chains to the rock was begun to be fixed; and in July a new act of parliament was passed, conferring greater authority on the commissioners; besides which the Treasury issued 108,498*l*. 1*s*. for completing the bridge and paying the sum awarded by the jury for the purchase of Bangor Ferry. In 1824 the works were so far advanced, that the only remaining difficulty was, 'How are the main chains to be put up?' a question that gave rise to much speculation and doubt, for no precise details had been determined upon up to that time, which was so far an advantage, that the engineer had the benefit of full consideration and experience, and many mistakes were obviated that must have happened had the details been all settled beforehand.

In the beginning of May the cast-iron segments and saddles were carried up to the pyramids; but it was not till the April of the year 1825 that the first chain was fixed, which operation was then most satisfactorily accomplished. After the second chain had been put up, it was found necessary to replace some of the bars which had been damaged; and owing to this it was practically ascertained that if one or more links of a chain should at any time be injured, they could be taken out and replaced. On the 9th of July the last chain was fixed, and by the end of August the whole of the suspended parts of the chains had been connected with each other; and on the 2nd September the suspending of the roadway-bearers was commenced. In January, 1826, preparations were made for opening the bridge, and on Monday the 30th the mails drove over it for the first time. Shortly after however (February 6) a tremendous gale did considerable damage to the iron-work, and repeated gales during the spring tended greatly to retard the necessary operations in repairs. But no inconvenience has been since felt; and there is reason to believe that, with ordinary care and attention, this noble structure will last for ages.

With respect to the constructive details and operations of the work, those who wish for such information will find all the particulars in a large folio by W. Alexander Provis, the superintending engineer, entitled, 'An Historical and Descriptive Account of the Suspension Bridge over the Menai Strait in North Wales,' &c., London, 1828

All that we add is the following (as given by Drewry in his work on suspension bridges):

	Tons.	cwts.	qrs.	lbs.
The weight of the 16 main chains between the points of support, including connecting plates, screw-pins, wedges, &c., is	394	5	0	16
The transverse ties . .	3	16	2	20
The suspending-rods and platform, &c. . . .	245	13	2	27
Making the total suspended weight	643	15	2	

According to Mr. Rhodes's experiment the tension on the iron at each point of suspension is 1·7 times the whole suspended weight, or 1094·42 tons. The entire section of the bars of the chains is 260 square inches, which would bear 7020 tons without breaking; or taking the standard of 9 tons per square inch, the chains will bear without any risk (9 × 260 =) 2340 tons, or 2340 — 1094·42 = 1245·5 tons more than the strain produced by the weight of the bridge itself; consequently it may safely be loaded with $\frac{1245 \cdot 5}{1 \cdot 7}$ or 732½ tons, besides its own weight.

MENANDER (Μένανδρος), a Greek comic poet, one of that class who are called the writers of the new comedy, was born B.C. 341, and died, as some suppose, by drowning, B.C. 289 or 290. According to Suidas he was the son of Diopeithes and Hegistraté, was cross-eyed, and yet clear-headed enough.* The same authority says that he was inordinately addicted to women. He wrote more than one hundred comedies, of which only fragments remain, but in spite of this fertility, and although the most admired writer of his time, he was only eight times victor. His master was Theophrastus, according to the testimony of Pamphila.

All antiquity agrees in praise of Menander. We learn from Ovid that his plots all turned on love, and that in his time the plays of Menander were common children's books—

> 'Fabula jucundi nulla est sine amore Menandri,
> Et solet hic pueris virginibusque legi.'
> Ovid, *Trist.*, ii 370.

Julius Cæsar called Terence a 'dimidiatus Menander,' having reference to his professed imitation of the Athenian dramatist. Plutarch preferred him to Aristophanes, and Dion Chrysostomus to all the writers of the old comedy. Quintilian (*Inst. Orat.*, x., 1. 69) gives him unqualified praise as a delineator of manners. From these notices, from the plays of Terence, and from an awkward compliment passed upon him by Aristophanes the grammarian, we may infer Menander to have been an admirable painter of real life. His effeminate and immoral habits, and that carelessness in his verses, which subjected him to the charge of plagiarism, or at least of copying, all point to the man of fashion rather than the imaginative poet. And indeed the writer of what is termed the new comedy (that, namely, which satirised characters, not persons) had more occasion for knowledge of the world than for higher qualities, just as the fashionable novel-writer of the present age had much better be a nobleman or a member of parliament than a philosopher or a speculative thinker. It has been observed that there is very little of the humourous in the fragments of Menander which remain; but we cannot judge of a play by fragments. Sheridan's plays, if reduced to the same state, would be open to a similar charge, although he is perhaps the most witty writer of any age or country. The essential aim of the comedy of manners is to excite interest and smiles, not laughter.

The plays of Menander were probably very simple in the dramatic action. Terence did not keep to this simplicity, but, as he tells us himself, he added to the main plot some subordinate one taken from a different piece of Menander; thus, as he says, making one piece out of two.

Between the time of Aristophanes and that of Menander a great change must have taken place in the Athenian character, which was probably mainly brought about by the change in the political condition of the Athenian state. The spirit of the people had declined from the noble patriotism which characterised the plays of Aristophanes at a time when Athens was struggling for supremacy in Greece; and in the time of Menander, Macedonian influence had nearly extinguished the spirit that once animated the conquerors of Marathon and Platæa. Manners probably had not changed for the better in Athens, though the obscenity and ribaldry of Aristophanes would no longer have been tolerated. The transition from coarseness of expression to a decent propriety of language marks the history of literature in every country. Thus the personal satire and the coarseness which characterised the old comedy were no longer adapted to the age and circumstances in which Menander lived, and there remained nothing for him to attempt as a dramatist, but the new species of comedy in which, by the unanimous judgment of all antiquity, he attained the highest excellence.

The fragments of Menander are principally preserved in Athenæus, Stobæus, and the Greek lexicographers and grammarians. A good critical edition of the fragments of Menander and Philemon, by Meineke, was published at Berlin 1823, 8vo. It seems possible that some of the plays of Menander may yet exist; at least there is evidence to the fact of some of the plays having been in existence in the seventeenth century. (*Journal of Education*, i. 188.)

Many of the fragments of Menander have been well translated by Cumberland in the 'Observer.' (Suidas, ed. Gaisford, p. 2453; Fabr., *Bibl. Gr.*, vol. iii, p. 455, ed. Harles; *Encycl. Metropolitana.*)

* Στραβὸς τὰς ὄψεις ὀξὺς δὲ τὸν νοῦν.

MENANDER PROTECTOR, a Greek writer, who lived at Constantinople during the latter half of the sixth century. He was one of the emperor's body-guards, whence he derived the surname of Protector. (*Cod. Theodos.*, vi. 24.) He wrote a history of the Eastern empire from A.D. 559 to A.D. 582, in eight books, of which considerable extracts have been preserved in the 'Eclogæ Legationum,' attributed to Constantine Porphyrogennetus. The best edition of Menander is by Bekker and Niebuhr, Bonn, 1830, together with the fragments of Dexippus, Eunapius, Patricius, &c.

MENASSEH BEN ISRAEL, a celebrated Jewish Rabbi, was born in Spain about A.D. 1604. He was educated in Holland, whither his father, Joseph Ben Israel, had fled to escape the persecution of the Inquisition. At the age of eighteen he succeeded his tutor, Rabbi Isaac Usiel, as preacher and expounder of the Talmud in the synagogue at Amsterdam; and he soon after commenced his work entitled 'Conciliador,' on which his reputation as one of the most learned and accurate of Jewish theologians chiefly rests.

At the age of thirty-five he lost his fortune through the confiscation of his father's property by the Spanish Inquisition; and in consequence of this loss he betook himself to commerce, a necessity of which he grievously complained on account of the interruption which it caused to his studies. He came over to England during the Protectorate, and was graciously received by Cromwell, from whom he obtained some favours for his nation. He died at Amsterdam about 1659.

Menasseh lived on terms of intimacy with several of the most learned men of his age, by whom he was highly esteemed for his erudition and moral worth. Grotius testified his respect for the Rabbi's learning by consulting him on the most difficult points of theology, and by recommending his works, especially the 'Conciliador,' to the attention of biblical students. Menasseh was strongly attached to Judaism, and some of his works are disfigured by the introduction of invectives against Jesus Christ.

The following are his chief works:—

1, 'Conciliador nel Pentateucho,' published in Spanish at Amsterdam in 1632. A Latin translation of this work, by Dionysius Voss, was published at Frankfort in 1633, with the title, 'Conciliator, sive de Convenientia Locorum S. Scripturæ quæ pugnare inter se videntur.' 2, 'De Resurrectione Mortuorum,' Amst., 1636. 3, 'De Creatione Problemata xxx.,' Amst., 1635. 4, 'De Termino Vitæ Libri iii.,' Amst., 1639. 5, 'Spes Israelis,' and in Spanish, 'Esperanza de Israel,' Lond., 1650. 6, 'A Defence of the Jews in England,' Lond., 1656. 7, An edition of the Hebrew Bible. in 2 vols. 4to., Amst., 1635.

MENDELSSOHN, MOSES, was born at Dessau, in 1729, where his father Mendel was a schoolmaster. Being a Jew, he instructed his son in the Hebrew language and the elements of Jewish learning, though he caused him to be instructed in the Talmud by others. The celebrated work of Maimonides, 'Moreh Nevochim' (the guide to the wanderers), he studied with such zeal that an impaired constitution and a distorted spine were lasting marks of his application. This work however seems to have strengthened his mental powers. In 1742 he went to Berlin, where he subsisted on the small bounties of the members of his own persuasion; but his mind was greatly improved by his intercourse with men of superior intellect. Israel Moses, a Jewish mathematician, urged him to read Euclid's 'Elements;' a physician named Kitsch instructed him in Latin; and by the aid of Dr. Aaron Salomon Gumpertz, he became acquainted with modern literature. He lived for some time in a very humble condition, until a rich silk-manufacturer, named Bernard, took him into his house as instructor to his children. He subsequently became a superintendent in the factory, and was ultimately taken into

partnership. His intimacy with Lessing began in 1754, and is said to have been of the greatest advantage to him. Philosophy now became his favourite study, and his first work was his 'Briefe über die Empfindungen' (letters on the sensations). He published other philosophical works from time to time, and gained a high reputation for acuteness, rather than for originality of thought: his excellent moral character also greatly contributed to the respect in which his religious authority was held. His 'Jerusalem, oder über Religiöse Macht und Judenthum' (Jerusalem, or an essay on the interference of the state in matters of religion and Judaism) appeared in 1783. He had begun a philosophical work entitled 'Morgenstunden' (morning hours), of which the first volume was published, when he received Jacobi's 'Essay on the Doctrine of Spinoza.' He thought that this essay charged his friend Lessing (the deceased) with Spinozism; a charge then much more heavy than at present, when many German philosophers are avowed admirers of Spinoza. The zeal with which he defended his friend by a written answer excited him to such a degree, that a cold, which he subsequently took, was sufficient to terminate his existence in 1786.

As an instance of the successful pursuit of knowledge under difficulties, Mendelssohn is immortalised; and to do him full justice, the circumstances of his life must be remembered by the reader of his works, one of which has been translated into almost every European language: this is his 'Phædon,' a dialogue on the immortality of the soul, held between Socrates and his disciples. The characters are taken from Plato's dialogue of the same name, and the descriptive parts are mere translations of the original. The Jewish philosopher however has made Socrates produce new arguments in place of those attributed to him by his disciple Plato; thinking these new arguments better adapted to the conviction of modern readers. The following is his principal and indeed his only argument, the rest of the dialogue being employed in its defence, and in expressions of reliance on the goodness of the Deity. For change three things are required: first, a state of the changeable thing prior to its change; secondly, the state that follows the change; and thirdly, a middle state, as change does not take place at once, but by degrees. Between being and not-being there is no middle state. Now the soul being simple, and not, as a compound body, capable of resolution into parts, must, if it perish, be absolutely annihilated; and in its change from death to life, it must pass at once from being to not-being, without of course going through any middle state; a change which, according to the three requisitions of change, is impossible. Thus by *reductio ad absurdum* the immortality of the soul was proved. Kant, in his 'Critik der reinen Vernunft' (second edition*), has shown the futility of Mendelssohn's argument, while he admits his acuteness in perceiving that mere incapability of resolution into parts was of itself not sufficient to preserve the immortality of the soul, as had been supposed by many philosophers of the time. Mendelssohn, by assuming that change must be gradual and not sudden, thought that he had established his point, as the soul, being simple, could not admit of gradual resolution. Kant however shows that we may conceive a gradual annihilation even without resolution into parts; or, to use his own expression, a diminution of the *intensive magnitude*. Thus a deep red colour may grow fainter and fainter till at last all the redness is gone, and this without any diminution of the surface coloured. Another fallacy in Mendelssohn's argument is that his definition of change applies only to a transition from one state of being to another, and therefore does not include a transition from being to not-being. For if not-being be considered a state of being, there is no occasion for an argument at all, as the continuance of being is assumed in the definition of change, nor would anything be gained by supposing the soul in such a paradoxical state as nonentity with still a sort of being attached to it.

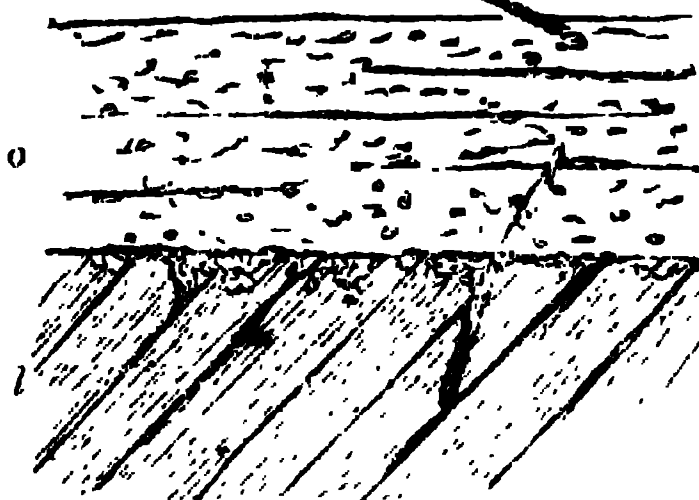
A magnificent edition of Mendelssohn's works was published lately at Berlin: an English version of the 'Phædon' appeared in 1789 and also in 1838.

MENDE. [LOZÈRE.]

MENDICITY. [PAUPERISM.]

MENDIP HILLS, a long ridge of limestone extending from Wells in Somersetshire to the Bristol Channel at Bleydon Hill and Brean Down. Through its whole length it is what geologists term an anticlinal axis, the strata dipping to the north, under the drainage of the Avon and the Yeo, and to the south under the low plains watered by the Axe and the Brue. This axis passes from Frome by the Beacon Hill above Shepton Mallet, Mashury Castle, Nine-Barrow Hill, and Black Down, to Bleydon Hill, Uphill, and Brean Down, from whence, according to Buckland and Conybeare, it may be supposed to be continued into the Steep Holm in the Bristol Channel.

Along the line of the axis of Mendip old red-sandstone strata show themselves for considerable lengths, and form the nucleus of this miniature mountain-range. They are exposed on the roads from Wells to Chewton Mendip, and to Harptree, in each case evidently lying below the carboniferous limestone. Upon the slopes of this limestone, both north and south, rest considerable stratified masses of what is often justly termed magnesian conglomerate, and this is covered by the general mass of red marls which fill so large a tract in the low parts of Somersetshire. The limestone series is estimated by Buckland and Conybeare at from 500 to 800 yards thick. The axis of the Mendip Hills runs irregularly east and west: the geological æra of its principal upward movement appears to be anterior to the red marls, and probably to the red conglomerate; though near Wells and in other parts the slope of the conglomerate beds proves a subsequent movement. There is no better example known of the unconformity of strata than that presented in Vallis Bottom, near Wells, by the junction of the lower oolite formation and the mountain or carboniferous limestone. Here the upturned and almost vertical strata of mountain-limestone are found covered by horizontal strata of oolite, each of these contrasted rocks containing the characteristic fossils which belong to them elsewhere. What renders the case more curious is the fact that the level surface of the subjacent inclined beds of limestone is not only worn smooth by littoral action below the oolite, but also covered by attached oysters, and perforated by the lithophagous shells of the oolitic sea into large and small holes now full of the oolite, and partly retaining the boring shells not uncommon in that rock.



o, the oolite in level beds; *l*, the mountain limestone in steeply inclined beds.

The most elevated point of the Mendip Hills is Masbury Castle, about 999 feet above the sea-level.

The features of these hills remind the observer of some parts of northern Derbyshire, both in the wide bare surface of limestone and the rugged glens which suddenly break the dullness of the open country. These narrow valleys appear like cracks and fissures in the mass of calcareous rocks, which, in Cheddar Cliffs, rise 285 feet perpendicularly from the feet of the spectator, and undoubtedly exceed in grandeur the noblest rocks of Derbyshire or Yorkshire. Several of these glens are called 'combes,' and Brockley Combe may be taken as a beautiful example of the mixture of gray rock and antient wood.

From the chasms just alluded to the transition is easy to the caves and internal fissures, which are numerous in Mendip. Many of these have become familiar to geologists by the uncommon abundance of bones found in them by a host of explorers since the days of Catcott, the celebrated and unfortunate explorer of Hutton Hole.

Dr. Buckland, in his 'Reliquiæ Diluvianæ,' describes, from the notes of Mr. Catcott and Mr. Conybeare, the circumstances under which the teeth and bones of elephants, horses, oxen, stag, bear, fox, and other animals of the 'Mastozootic' æra occurred at Hutton. The bones were found in the ochre-pits, which were antiently worked; they were mostly white, well preserved, and appear to have been drifted in by water, or collected from the falling in of quadrupeds roaming on the surface.

* Not in the first edition. The complete edition of Kant's works, now publishing by M. Rosenkranz, at Leipzig, is highly valuable, as distinguishing the additions made in subsequent editions to the original form.

At Burrington, in the Mendip Hills, and also in Wokey Hole, a celebrated cavern near Wells, human bones have been found of high antiquity, but being accompanied by urns or other marks of sepulture, it is not supposed they belong to races contemporary with the mammoth and large cavern bear. The specimens of this latter animal in the cave at Hutton are of enormous bulk.

Not far from Hutton Hole is the no less renowned cavern of Banwell, explored under the direction of the bishop of Bath and Wells. The best collection of the contents of this rich repository is to be seen near the mouth of the cave, at the house of Mr. Beard. The complicated parts of this cavern are accessible by steps made in the rock, and are much visited. The bones belong chiefly to oxen and deer. Bones of elephants, bears, and other carnivora occur less commonly. The specimens are usually in admirable preservation, and contrast remarkably with the fragmentary bones of the same animals at Kent's Hole and Kirkdale.

Very recently Mr. Long communicated to the British Association at Newcastle a notice of human bones found in a cave at Cheddar.

The Mendip Hills, in their metalliferous products, resemble the similarly constituted mountains of Derbyshire and Flintshire. They yield galena, calamine (carbonate of zinc), and ochre. Manganese is dug about East Harptree. The galena occurs principally in limestone; the calamine belongs to the overlying magnesian conglomerate. In that rock agates occur, and the large geodic crystallizations of quartz called 'potatoe-stones.' The fossil corals, shells, trilobites, &c. of the Mendip Hills have been long known to collectors; but a complete account of them has, we believe, never been prepared.

(Conybeare and Phillips, *Geology of England and Wales*; Buckland and Conybeare, 'On the South-west Coal District of England,' in *Geol. Trans.*, vol. i., new series.)

MENDOCI'NO, CAPE. [CALIFORNIA.]

MENDOZA, INIGO LOPEZ, better known as the Marques de Santillana (Sancta Juliana), was born in 1398, at Carrion de los Condes, and died in 1458. He was grandson of the poet Pero Gonzalez Mendoza, and a descendant of that Mendoza who, in the battle of Aljubarrota, saved the life of Juan I. at the expense of his own. (Romance de Hurtado de Velarde: 'El Caballo vos han muerto'.) He was also the father of the first duke of Infantado, who secured the preservation of his valuable library and directed it to be kept at his palace of Guadalajara.

Santillana was the most elegant scholar at the court of Juan II., then the most brilliant in Europe. Much of his poetry is still in MS., and is partly lost or lying in dust. Several of his pieces however, chiefly devotional and amatory, are contained in the older Cancionoros. Like the compositions of D. Juan Manuel, the marquis Enrique de Villena, and many others, they exhibit a singular contrast with the fierceness of that period. They throw a false shade, perhaps a decent veil, over realities too disgraceful and disgusting, from which the gifted few sought mental relief in subtility and imaginary affection; but such poetry can never touch the heart nor even be forcibly expressed when it is not genuine, that is to say, when it is not deeply felt. By introducing the sonnet, Santillana (Quintana's *Poes. Escog.*), became a forerunner of the bold innovator Boscan. But he did more, by endeavouring to impart a moral tendency to the national poetry, by extending it by allegorical invention, and embellishing it with learning. His efforts in that respect are apparent in his 'Elegy to his tutor and friend Villena,' and his 'Doctrinal de Provados,' which show that he was no adherent of Alvaro de Luna. All parties were eager to obtain the powerful assistance of Santillana's military, political, and moral character. His 'Refranes' (traditional proverbs) were reprinted by the learned Mayans (*Origenes de la Lengua Castellana*, vol. i., p. 179.)

Fernando del Pulgar, Sarmiento (*Obras Postumas*), Nico. Antonio, and Sanchez (*Colec. de Poes.*), give much curious information on this Mendoza.

MENDO'ZA, DIE'GO HURTA'DO, a scholar, statesman, and general under Charles V., was grandson of the above Mendoza, and younger son of the first marquis of Mondejar, who was also second count of Tendilla. He was born in 1503, at Granada, and not at Toledo, as was supposed by Tamayo Vargas. He received his early education at home from Peter Martyr d'Angleria, who had been brought to Spain by the first count of Tendilla to teach the youth of the nobility. After learning Arabic at Granada, he studied Latin, Greek, Hebrew, divinity, and civil and canon law at Salamanca, where, by way of relaxation, he produced the first specimen of the comic romance, in his 'Lazarillo de Tormes,' a work which has been improperly ascribed by Siguenza to the Jeronymite Juan Ortega. It is written in that *gusto picaresco*, which was much in fashion in the seventeenth century. Being sent from the university to the Imperial army in Italy, to show his talents in a new capacity, he still found time occasionally to visit the universities of that country, and to hear the eminent lecturers, such as Niphus of Naples and Montesdoca of Seville. In his capacity of ambassador at Venice and at Trent, where political interests were at stake; at Rome, the centre of intrigue; and as general in Tuscany, which was threatened by the Turks and their ally Francis I., he always defeated the treachery of the French king, and baffled the designs of all parties. He faced every danger, and commanded the respect and admiration even of those whom he could not please. (Paul. Mann., *Cic. de Philoso.*, Lazaro Bonamico.) Nor could he conceal that spirit of freedom which Charles had destroyed in Spain. He strongly reprobated his sale of the Tuscan fortresses to Cosmo de' Medici, and by his opposition prevented his transfer of Milan and Siena to Paul III., who wanted to buy them for Octavio Farnesio. In a letter to Zuñiga, alluding to ambassadors, he boldly says, 'When kings wish to cheat, they begin by us.' The republicans or burgesses indeed looked on Mendoza as the greatest enemy of Italy. That country however was indebted to him for having introduced into it the writings of Basil the Great, Gregory of Nazianzus, Cyril of Alexandria, Archimedes, Appian, and others. Not satisfied with employing Arnoldus Ardenius in transcribing the Greek MSS. of different libraries, especially those which Cardinal Bessarion had bequeathed to Venice, Mendoza sent Nico [illegible] to Thessaly and Mount Athos in search of manuscripts. He also paid a heavy ransom for a Turkish prisoner who was a favourite of Solyman the Magnificent. As a return for this service [illegible] antient works from the sultan, to whom they were useless, and begged him to permit the Venetians, then in great want of corn, to import it from Turkey. His request was granted, with a present of several chests of literary treasure. In 1555 Mendoza was superseded at Rome, in order to propitiate Julius III. Subsequently he fell under the displeasure of that heartless bigot Philip II., who banished from his court this old servant, then sixty-four years of age. This act of royal severity proved however beneficial both to the illustrious veteran and to posterity. In his retirement at Granada Mendoza prosecuted those studies which were congenial to his taste: he investigated antiquities, collected above 400 Arabic MSS., and crowned his literary fame by his 'Guerra contra los Moriscos,' the publication of which, even with omissions, the government did not permit till the year 1610. The true text was restored in 1776, at Valencia, by Portalegre, who prefixed to it the author's life, which, although ill written, is highly interesting. In this work, the finest specimen of the historical style in the Spanish language, Mendoza has left the best example of an imitation of the Latin historians that modern European literature possesses. The rich and florid diction of this history forms a contrast with the conciseness and rigidity of Sallust, with whom however Mendoza has generally been compared. The modern historian is a model of impartiality: he does not even spare his own brother. Having been an eye-witness of most of the events which he has so admirably recorded, he has happily combined in the same work the strictest accuracy with integrity and the ability of a great writer.

In 1575 Mendoza obtained permission to return to Madrid on business, but he died shortly after his arrival there. He bequeathed his valuable library to the king. Ambrosio Morales, Nico. Antonio, Bouterwek, and many others, are profuse in their eulogiums of Mendoza. Juan Diaz published his poems in 1610 at Madrid, but without the numerous comic and satiric pieces. Other more important works of his have never yet been published: among them are his political commentaries.

MENDO'ZA. [PLATA, LA.]

ME'NE'HOULD, SAINTE. [MARNE.]

MENELA'US (called also MILLEUS by Apian and Mersenne, but on what authority is not known; in a copy of Weidler which belonged to Montucla we find the latter, in a manuscript note, describing Milleus as 'Menelaus

défiguré par les Arabes') was an Alexandrian, who observed the stars for a long while at Rome, and was living there in the time of Trajan. He is mentioned by Proclus and Pappus, and probably is the person intended by Plutarch, who mentions a mathematician of that name. Pappus gives the titles, or other mention, of at least two works of Menelaus which have not come down to us. Ptolemy, in the Syntaxis, compares some of his own observations with those of Menelaus.

The only writing of Menelaus which has come down to us is the Latin treatise on spherical geometry, translated from the Arabic; the Greek is probably lost. This work, in three books, was published (Lalande) in a collection of Greek geometers made at Paris, in 1626; and afterwards Lalande, Heilbronner) by Mersenne, in his 'Universæ Geometriæ Synopsis,' Paris, 1644; also (Heilbronner and Weidler) by Regiomontanus. Another work on chords is said by Heilbronner to be contained in Mersenne's Synopsis: this is a mistake, since the work is entirely lost.

The books of Menelaus on spherical geometry have been much used by Ptolemy in the Syntaxis, and the latter had for a long time the credit of two very remarkable propositions which appear in Menelaus, and which have been much used by Carnot and others in the modern extensions of geometry. These are the well known propositions relating to a transversal which cuts the three sides of a triangle, plane or spherical. [TRIANGLE.] There are other propositions of great ingenuity; so that Menelaus, who must be looked on as the successor of Hipparchus and Theodosius in the school of Greek geometers who treated of the doctrine of the sphere, must also be considered as having gone considerably beyond his predecessors.

MENES. [EGYPT.]

MENGS, ANTON RAFAEL, one of the most distinguished artists of the eighteenth century, was born at Aussig in Bohemia, in 1728. He was scarcely six years old when his father, who was himself a painter, though one of very moderate ability, being determined to bring him up to the same profession, whether he had talent or not, adopted a course of education for him more calculated to inspire him with a disgust than with a true relish for it. Being of a most harsh and tyrannical disposition, he compelled the boy to employ himself in drawing the whole day long, allowing him neither recreation nor relaxation from his tasks. In course of time Rafael was instructed by his father in oil painting, and miniature and enamel painting, but was still tasked in the same rigorous manner, and frequently received severe chastisement, if he had completed not within the time allotted him—which was generally short enough—what he had been set to do. In 1741 his father quitted Dresden, whither he had been called by Augustus III. (for he was a native of Denmark), and went to Rome, taking young Mengs with him. On his arrival in that city, his father used to take him every morning to the Vatican, in order that he might there study the productions of Raffaelle, and would make him remain there the whole day, without other refreshment than a bottle of water and piece of bread, until he came to fetch him back in the evening; nor was he even then allowed to recruit himself from his fatigue, but compelled to revise and finish up the studies he had brought home. This excessive drudgery did not however disgust him with the profession to which he was thus in a manner yoked: still the mode of life it occasioned was prejudicial, inasmuch as it prevented his acquiring other knowledge, and tended to render him shy of all society. In 1744 he returned with his father to Dresden, where his talents obtained for him the notice of Augustus, who appointed him court-painter; but according to a stipulation he had previously made, he was permitted to return to Rome, and his father accompanied him. After continuing his studies some time longer, he began to distinguish himself by his original compositions, among the rest by a Holy Family, in which the Virgin was painted from a beautiful peasant girl, of whom he became so enamoured, that he turned Catholic for her sake and married her. After that event he again returned to Dresden, where his pension was raised to a thousand dollars, and he was commissioned by the king to paint a large altar for a new chapel; which he wished to execute at Rome. But on his arrival there, other commissions (among which was a copy of Raffaelle's 'School of Athens' for Lord Percy, afterwards duke of Northumberland), and the Seven Years War, which caused the stoppage of his pension, interfered with the prosecution of the work. In 1757 he made his first attempt in fresco, a ceiling-piece in St. Eusebio, which was in too simple a style to satisfy the taste of that day. His 'Apollo and the Muses,' another work of the same class, in the Villa Albani, obtained for him much greater renown, and is one that will bear comparison with those by the greatest Italian masters. About this time he became acquainted with Webb, to whom he communicated his ideas on art, which the other passed off as his own in his 'Remarks on Poetry and Painting.' Mengs's reputation was greatly increased by the numerous works he executed for Charles III. of Spain, by whom he was invited to Madrid in 1761, and remained in that country till 177[illegible], with the exception of an interim of three years, in the course of which he painted the ceiling of the Camera de' Papiri at Rome. His pencil was employed in decorating the royal palaces of Spain; and the Apotheosis of Trajan, in that of Madrid, is considered his chef d'œuvre.

After a marriage of the utmost domestic harmony, Mengs lost his wife in 1778. From that time his health began to decline, nor was it long before he followed her to the tomb: he died on the 29th of June in the following year, and was buried by her side in the church of San Michele Grande at Rome. Notwithstanding the great sums he had received during his life, about 250,000 livres, instead of amassing money he left scarcely sufficient to defray the expenses of his funeral; but the king of Spain bestowed pensions on his two sons, and provided also for his five daughters. Although Mengs's reputation as an artist does not now stand so high as in the last century, he undoubtedly possessed many excellences, and, compared with his immediate contemporaries, deserved the applause showered upon him. Refined taste, nobleness of ideas, correctness of drawing, vigour of colouring, finished execution, and studied grace are merits of a high rank, which he possessed in an eminent degree; but though most carefully studied, and in conformity with the principles he laid down for the art, his works do not always display those loftier qualities of mind which the higher branch of historical painting demands. His writings, which were published after his death by the Cavalier d'Azara, contain many excellent precepts, and both practical and critical observations, and have accordingly been translated into the principal modern languages.

MENIN, or MEENEN, a fortified town in West Flanders, situated on the left bank of the river Lys, by which it is separated from France. It is 11 miles north from Lille, and 30 miles south from Bruges, in 50° 48′ N. lat. and 3° 12′ E. long.

Menin contains manufactures of linen, lace, and soap, besides many breweries, salt-refineries, and oil-mills. It also carries on a considerable trade in horses, cattle, sheep, corn, and tobacco. It has a population of 7909 inhabitants.

MENISCUS. [LENS.]

MENISPERMA'CEÆ are an important and extensive natural order of Exogenous plants, considered by some to be Polypetalous, and referred to De Candolle's Thalamifloral subclass; by others placed among the Monochlamydeæ of that author. The order consists of twining or scrambling shrubby plants, with alternate leaves without stipules, and small greenish or white unisexual flowers, often collected in large loose panicles or racemes. The floral envelopes are arranged in a power of three or four, and usually in more rows than one; whence arises the opinion that these plants belong to Polypetalous Exogens, the inner series being regarded as a corolla. The stamens are either distinct or monadelphous, either equal in number to the inner series of the calyx, and of the same number, or much more numerous. The carpels are in most cases three, or some multiple of that number, either distinct from each other or consolidated. The fruit consists of succulent one celled drupes, with a solitary seed, and a horseshoe shaped embryo, with thin flat cotyledons.

The wood of the stem is arranged essentially upon the Exogenous plan, but has some striking peculiarities. According to M. Decaisne, it has no annual concentrical layers. The woody plates are always simple, and do not divide longitudinally, as in other Dicotyledons, but increase each year by the formation of a new woody layer outside the former and inside the liber. The latter ceases to grow after the first year. In Cissampelos Pareira and some others new woody plates, like the first in appearance, but having no spiral vessels or liber, show themselves, at the end of several years, on the outside of the first, and produce around them a concen

tric circle, a formation which may be repeated a great many times. (*Comptes Rendus*, v. 393.)

Menispermaceæ are usually bitter and tonic plants; the species of Cocculus called Bakis, Fibraurea, cinerascens, and others, are used in their native countries as a remedy for intermittent fevers. Cocculus palmatus furnishes the Calumba root of the shops, a valuable bitter. Pereiria medica is used for the same reason in Ceylon, as is Clypea Burmanni in Malabar, and various sorts of Cissampelos in Brazil. But the bitter principle, which in its diluted state is thus valuable, becomes a dangerous poison, if concentrated, as in the seeds of Anamirta Cocculus, the Cocculus Indicus of the shops.



Menispermum canadense.

1, a male flower; 2, a female; 3, the ripe fruit; 4, a vertical section of the same, showing the embryo and horse shoe seed.

MENISPERMI'NA, a vegetable alkali extracted by Pelletier and Couerbe from the *menispermum cocculus*, or *cocculus Indicus*, in the shells of the fruit of which it occurs.

MENISPERMUM (so called from μήνη, the moon, and σπέρμα, seed, from the crescent-like form of its fruit), a genus of the natural family of *Menispermaceæ*, which formerly contained numerous species, many of them valuable for their medicinal and other qualities, such as the Calumba root; and the berries called Cocculus Indicus, which are now referred to the genus COCCULUS. Menispermum, as at present constituted, contains but few species; and these are climbing shrubs which have their sepals and petals in quaternary order, arranged in two or three whorls. *Male*, stamens 16 to 20; *Female*, ovaries 2 to 4; Drupes baccate, round, kidney-shaped, single-seeded. *M. canadensis* and *smilacinum* are found in the United States of America, and *M. Dauricum* in the wooded hills of Da-uria.

MENNONITES, a religious sect which sprung up in Holland and Germany about the time of the Reformation, and which is identified by many writers with the sect of the Anabaptists, with whom the Mennonites held several leading doctrines in common. [ANABAPTISTS.] They received their appellation from Simon Menno, who was born at Witmarsum, a village in Friesland, in the year 1505. In 1536 he left the Roman Catholic church, in which he was a priest, and joined the Anabaptists, among whom he became a teacher in the next year. During the remainder of his life, Menno travelled with his family and preached his doctrines throughout a great part of Germany and Holland, where he gained many proselytes, chiefly from among the Anabaptists. He died in the year 1561, in the duchy of Holstein. His works were published in one volume folio, at Amsterdam, in 1651. Though he is said to have been a notorious profligate when young, his character after he came forward as a religious teacher was unimpeachable; and he was possessed of considerable genius, some learning, and a persuasive eloquence. His doctrines were free from the anti-social and licentious tenets and the pretensions to inspiration which are ascribed to the Anabaptists; but he agreed with them in condemning the baptism of infants, in expecting a personal reign of Christ on earth for a thousand years at the Millennium, in excluding magistrates from the Christian church, and in maintaining that all war was unlawful, that the taking of oaths was prohibited by Christ, and that human science is useless and pernicious to a Christian. But these tenets were so explained and modified by Menno, as to differ very little from the doctrines generally held by the reformed churches. He insisted upon the strictest attention to moral duties, and exercised a most severe discipline upon offenders.

The followers of Menno very soon split into two sects, the Flemings and the Waterlandians, so called from the countries in which they arose. The latter somewhat relaxed the severe discipline of Menno towards offending members, which the former maintained in all its rigour. The Flemings divided again, on the subject of the treatment of excommunicated persons, into Flandrians and Frieslanders, and there also arose a third division called Germans. In process of time the greater part of these sects joined the Waterlandians.

The Mennonites put forth several confessions in the seventeenth century, the earliest of which is one drawn up by the Waterlandians. By these confessions it appears that their doctrines were nearly the same with those mentioned above as held by Menno. According to Mosheim, their fundamental principle was that 'the kingdom which Christ established upon earth is a visible church or community, into which the holy and the just are alone to be admitted, and which is consequently exempt from all those institutions and ... discipline that have been invented by human wisdom for the correction and reformation of the wicked.'

In the seventeenth century the Mennonites obtained toleration in Holland, Germany, and England. In the year 1630, a considerable part of them arranged their differences in a conference at Amsterdam, and formed a union, which was renewed in 1649.

Further information respecting this sect may be found in Herman Schyn's *Historiæ Mennonitarum plenior Deductio*, which is a defence of the Mennonites, and in which the author protests against their being confounded with the Anabaptists; and also in Mosheim's *Eccles. Hist.*, cent. xvi., sect. iii., part ii., c. 3; and cent. xvii., sect. ii., part ii., c. 5. It is to be wished that Mosheim had written the history of this sect in a spirit of greater candour.

MENOBRANCHUS. [NECTURUS.]

MENOPO'MA. [SALAMANDROPS.]

MENORCA, or MINORCA, is the second in size ('the minor') of the Balearic Islands. It is situated in the Mediterranean, off the eastern coast of Spain, between 39° 47′ and 40° 5′ N. lat., and between 3° 50′ and 4° 23′ E. long. It lies 24 miles to the east-north-east of Mallorca, about 125 miles south-east of the coast of Cataluña, 162 miles east by south from the mouth of the Ebro, the nearest part of Valencia, and about 190 miles north from the territory of Algiers in Africa. It has a circumference of 62 miles, and an area of about 300 square miles. In form it is irregular; being in length 33 miles, and in the broadest part 13 miles. The coast is indented on every side with small bays or deep creeks, and is surrounded with islets, rocks, and shoals.

Menorca was successively possessed by the Phœnicians, Carthaginians, Romans, Vandals, and Arabs. On the conquest of Mallorca, in A.D. 1229, by Don Jayme of Aragon, surnamed the Conqueror, Menorca, which was still held by the Moors, became tributary to that prince. In A.D. 1287 the island was conquered by Alfonso, grandson of Don Jayme the Conqueror, who banished or enslaved the Moorish inhabitants. In the reign of Charles V. it was seized, but soon evacuated, by Barbarossa. It remained subject to the crown of Spain till the year 1708, when the earl of Stanhope, with 3000 British troops, attacked Mahon, and by shooting into the town arrows to which were attached papers threatening the garrison with labour in the mines unless they immediately surrendered, he induced them to capitulate. The conquest of the island followed that of its capital, and was confirmed by the treaty of Utrecht: the English retained possession of Menorca till the year 1756, when

Mahon was attacked by the French under Marshal de Richelieu, and Admiral Byng having failed in relieving it, the island fell into the hands of France. At the peace of 1763 it was restored to the English, from whom it was wrested by the Spaniards in 1782; it was retaken in 1798, and finally ceded to Spain at the peace of Amiens in 1802.

In Menorca, the spring of the year is generally clear, mild, and temperate; the summer is intensely hot; the autumn is the season of the annual rains, which are exceedingly heavy; the winter is often cold, though snow and ice are rare. On the whole the climate is less agreeable than that of Mallorca; the air is more humid; and the summer heats more oppressive, which arises from the comparatively level character of Menorca. The only eminence deserving the name of mountain is Monte Toro in the centre of the island, the greater part of which is unsheltered from the violent north winds which in the winter rage in the Gulf of Lions, while the heats of summer are untempered by mountain breezes. The surface of the country is a gently undulating plain, rocky and barren, or partially clothed with wild olives and corn. The southern shore is the most level. The soil is for the most part poor and sandy; that on the slopes is much richer than that of the low grounds.

The mineral productions of Menorca are limestone, freestone, marble of various colours (little used however by the natives), slate, of which a quarry is worked at Cape Mola on the east side of the island, gypsum, used for cement, and potters' clay. There are a few lead-mines, very unproductive, and iron-ore is found in small quantities.

The vegetation of Menorca is very similar to that of Mallorca, though it is much less abundant, and the trees seldom attain to so large a size. Aromatic plants and herbs, many with medicinal qualities, grow in profusion. Wheat, barley, and a little maize are cultivated, though not enough for the consumption of the island; [illegible] return on an average six or seven for one. Olive trees grow almost without culture; little oil is made [illegible] from their fruit, which is generally [illegible] eating. Vines are plentiful, and produce both white and red wine. Fruit is abundant: there are oranges, lemons, pomegranates, figs, apples, pears, and almonds; the melons are of superior flavour. Date-palms will grow in sheltered spots, but yield no fruit. Capers grow spontaneously in all parts of the island. Flax, hemp, saffron, and the cotton-tree thrive well, but are little attended to. Vegetables are no less abundant than fruit, and consist chiefly of peas, beans, onions, cauliflowers, broccoli, tomatos, endive, cucumbers, and gourds, all excellent in quality.

Menorca is rich in cattle, sheep, goats, and pigs; and also in game, as partridges, quails, and rabbits; woodcocks, snipes, and teal are plentiful in winter. Fish, especially anchovies, with oysters, lobsters, and other crustacea, abound on the coasts. Lizards swarm, and there are a few venomous reptiles, but no beasts of prey.

The natives are engaged either in agriculture, fishing, or commerce. The imports consist of corn, oil, brandy, tobacco, coffee, sugar, spices, hardware and cutlery, linen and woollen goods, timber, cordage, tar, and gunpowder. The exports are wines, wool, cheese, salt, honey, and wax. The possession of Menorca by the English during the last century did much to promote its trade and commerce; a spirit of activity and enterprise was awakened, and the natives, besides engaging in mercantile pursuits, fitted out vessels as privateers, and enriched themselves at the expense of France and Spain. But since the island has reverted to the Spaniards, trade and commerce have greatly declined.

The island is divided into four *terminos*, or districts, Ciudadela, Mahon, Alhayor, and the united *terminos* of Ferarias and Mercadal. In each is a town of the same name, the capital of the district. The population of the whole island is about 35,000, of which the *termino* of Ciudadela contains 8000, of Mahon 19,000, of Alhayor 4000, and of Ferarias and Mercadal 4000. Ciudadela, the present metropolis of Menorca, is situated on the north-west coast, on a small port, shallow and difficult of entrance. The city is fortified, and its walls are partly of Moorish, partly of more recent construction. Its population is above 4000. The streets are narrow, crooked, and wretchedly paved; many of the houses are neat, and some handsome. A cathedral, two parish churches, several convents, an hospital, a barrack, with a government-house, are the public buildings.

Ciudadela, though the residence of the captain-general, the bishop, and the nobility of Menorca, is inferior in importance to Mahon, or Port Mahon, on the opposite or south-eastern shore of the island, and 24 miles from the capital, with which it communicates by a carriage-road. Mahon is said to have been founded by and called after Mago, a distinguished Carthaginian commander. It is picturesquely situated at the bottom of a deep and narrow bay, on rocks much elevated above the sea, and in many places undermined by the waves. Mahon was formerly surrounded with walls, the only relic of which is a gateway of Arabian architecture. The streets are steep, narrow, crooked, and badly paved: the governor's house, town-hall, hospital, barracks, and other public buildings are scarcely worthy of notice; the private houses are neat and clean, built with taste, but often without regard to comfort, for many being on the English model, they are ill adapted to the sultry climate. Some of their roofs are tiled, and some flat-terraced in the Oriental style. The port of Mahon is one of the best in the Mediterranean, or (it has been said) in the world, as a large fleet of line-of-battle ships may ride within it in seven or eight fathoms water, perfectly sheltered from every wind. The Spaniards have a saying, 'The ports of the Mediterranean are June, July, August, and Port Mahon:'

> 'Los puertos del Mediterraneo son
> Junio, Julio, Agosto, y Puerto Mahon.'

Port Mahon alone made the possession of Menorca an object of contention among the maritime nations of Europe during the past century. In the harbour are four rocky islets; on one stands an hospital, on another a quarantine establishment, on a third a lazaretto, and on the fourth an arsenal with naval storehouses—all erected by the English. At a short distance from Mahon stood Fort St. Philip, famed in the military annals of the last century, and once a league in circumference. It is now a heap of ruins, having [illegible] by the Spaniards in 1803, to prevent its being used by the English, in case they should again seize the island.

The other ports of Menorca are, Fornels, a well sheltered bay, capable of holding a large fleet, and Adaya, a small harbour, full of rocks and shoals, and only entered by fishing-craft.

Alhayor, Mercadal, and Ferarias, the other district-capitals of Menorca, are little more than villages, and contain nothing worthy of notice.

Monte Toro is in the form of a cone, with a flat summit which is occupied by an Augustin convent, to which pilgrimages are often made by the natives with bare feet. Mount St. Agatha, the eminence next in importance, is supposed to have been a military post in the time of the Romans, and traces of a Moorish fortification are still visible on its summit. Two miles south of Ciudadela is a curious grotto, called 'La Cava Perella,' full of stalactites and stalagmites; and in the same vicinity is another cavern containing a pool or lake of salt-water.

Menorca is not rich in antiquities. About two miles from Alhayor is a rude pyramidical ruin of Druidical character, ascribed to the Phœnicians, the earliest colonists of the island; but whether it be temple, tomb, or watch-tower is yet disputed. Punic, Greek, Roman, Gothic, and Arab coins have been discovered; together with small statues of bronze, vases, lamps, urns, &c., chiefly of Roman origin.

In character and manners, the Menorquines resemble the natives of Mallorca. They are equally attached to their native soil, and to their customs and religion, but they are less indolent and more enterprising. Like the Mallorquines they are proud, boastful, and irascible, yet ordinarily mild and peaceable. The same dress and language are common to both.

(Dameto and Mut, *History of the Balearic Kingdom*; Armstrong's *History of the Island of Minorca*; Laborde, *Itinéraire Descriptif de l'Espagne*; St. Sauveur, *Travels through the Balearic and Pithyusian Islands*.)

MENSTRUUM. [SOLVENT.]

MENSURATION is the name given to a branch of the application of arithmetic to geometry, which shows how to find any dimension of a figure, or its area, or surface, or solidity, &c., by means of the most simple measurements which the case will admit of. We need hardly say that a complete treatise on this science would involve every branch of mathematical science. We shall in this article collect together the most important rules, the method of using which will be obvious to all who can employ the trigono

metrical tables. By the length of a line we mean the number of linear units contained in it, and by its square and cube the number of units multiplied by itself once and twice.

The measurement of lengths and directions resolves itself for the most part into the determination of a side or angle of a triangle, when other sides or angles are given. The triangle may be either on a plane or on a sphere; but we refer the latter to SPHERE, since the use of spherical trigonometry can only be well explained in connection with astronomy. Let a, b, c be the sides of a triangle and A, B, and C the opposite angles. If the triangle be right angled at C, we have the following formulæ:—

$$a = c \sin A = c \cos B = b \tan A = b \cot B$$
$$b = c \sin B = c \cos A = a \tan B = a \cot A$$
$$c = \frac{a}{\sin A} = \frac{a}{\cos B} = \frac{b}{\sin B} = \frac{b}{\cos A}$$
$$c = \sqrt{(a^2+b^2)} \quad a = \sqrt{(\overline{c+b}.\overline{c-b})} \quad b = \sqrt{(\overline{c+a}.\overline{c-a})}$$

The preceding formulæ contain the solution of every case of right angled triangles.

We now pass to oblique angled triangles, of which there are four cases.

1. Given the three sides, a, b, and c, to find the angles. Let the perpendicular let fall from C upon the longest side c divide it into two segments α and β adjacent to a and b, and let b be $> a$. Then the equations

$$\beta+\alpha = c, \quad \beta-\alpha = \frac{(b-a)(b+a)}{c}$$

(in which $\beta-\alpha$ is easily found by logarithms), will give β and α. Then

$$\cos B = \frac{\alpha}{a} \quad \cos A = \frac{\beta}{b} \quad C = 180° - (A+B)$$

Another method is as follows. C[illegible] M from the following*

$$s = \frac{a+b+c}{2} \quad M = \sqrt{\left(\frac{\overline{s-a}.\overline{s-b}.\overline{s-c}}{s}\right)}; \text{ then}$$

$$\tan \tfrac{1}{2} A = \frac{M}{s-a} \quad \tan \tfrac{1}{2} B = \frac{M}{s-b} \quad \tan \tfrac{1}{2} C = \frac{M}{s-c}$$

2. Given two sides a and b, and the remaining angle C, required c, A, and B. Firstly, to find the angles, determine

$$\tfrac{1}{2}(B+A) \text{ from } \tfrac{1}{2}(B+A) = \tfrac{1}{2}(180° - C)$$
$$(B-A) \text{ from } \tan \tfrac{1}{2}(B-A) = \frac{b-a}{b+a}.\cot \tfrac{1}{2} C$$
$$A = \tfrac{1}{2}(B+A) - \tfrac{1}{2}(B-A); \; B = \tfrac{1}{2}(B+A) + \tfrac{1}{2}(B-A)$$
$$c = b\frac{\sin C}{\sin B} = a\frac{\sin C}{\sin A}$$

To find the third side without the aid of the angles, assume

$$\sin\theta = \frac{\sqrt{(ab)}.2\cos\tfrac{1}{2}C}{a+b}, \text{ then } c = (a+b)\cos\theta;$$

or

$$\tan\theta' = \frac{\sqrt{(ab)}.2\sin\tfrac{1}{2}C}{a-b}, \text{ then } c = \frac{a-b}{\cos\theta'}$$

3. Given a, b, and the angle A, to find the rest:

$$\sin B = \frac{b}{a}\sin A, \; C = 180° - (A+B), \; c = \frac{a\sin C}{\sin A}$$

4. Given a, and two of the angles, to find the rest. It is unnecessary to distinguish the angles given, as two immediately determine the third.

$$b = a\frac{\sin B}{\sin A}, \; c = a\frac{\sin C}{\sin A}$$

The area of the triangle is

$$\frac{ab\sin C}{2} \text{ or } \frac{bc\sin A}{2} \text{ or } \frac{ca\sin B}{2} \text{ or } \sqrt{(s.\overline{s-a}.\overline{s-b}.\overline{s-c})}$$

The perpendiculars let fall from the vertices A, B, and C, upon the opposite sides, are severally $2\sqrt{(s.s-a.s-b.s-c)}$ divided by a, b, and c.

$$\text{Diam. of inscribed circle } 2\sqrt{(\overline{s-a}.\overline{s-b}.\overline{s-c} \div s)}$$

$$\text{Do. of circumscribed circle } \frac{a}{\sin A} \text{ or } \frac{b}{\sin B} \text{ or } \frac{c}{\sin C}$$

* This convenient adaptation of a well-known formula is found, we believe, for the first time in Professor Wallace's lately published work on Mathematical Theorems and Formulæ (Longman, 1839).

$$\text{or } abc \div 2\sqrt{(s.\overline{s-a}.\overline{s-b}.\overline{s-c})}$$

Segments of c made by perpendicular from C,

$$\text{Adjacent to } a, \frac{c^2+a^2-b^2}{2c}; \text{ to } b, \frac{c^2+b^2-a^2}{2c}.$$

Segments of c, by line bisecting C,

$$\text{Adjacent to } a, \frac{ac}{a+b}; \text{ to } b, \frac{bc}{a+b}.$$

$$\text{Line bisecting } C = \frac{2\sqrt{(abs.\overline{s-c})}}{a+b} = \frac{2ab}{a+b}\cos\tfrac{1}{2}C$$

$$\text{Line bisecting } c = \tfrac{1}{2}\sqrt{(2a^2+2b^2-c^2)}.$$

The area of a rectangle (in square units), and that of a parallelogram, is the product of the units in the base and perpendicular distance of the opposite sides. But if two sides only be parallel, half the sum of the parallel sides must be multiplied by the perpendicular distance between them. In other cases, the figure must be measured by dividing it into triangles, except when it is either a four-sided figure capable of inscription in a circle, or a regular polygon. Every triangle is half of the rectangle contained by any one of its sides, and the perpendicular let fall from the opposite vertex.

If a, b, c, and d be the sides of a four-sided figure inscribed in a circle, and s their half-sum, the area is

$$\sqrt{(\overline{s-a}.\overline{s-b}.\overline{s-c}.\overline{s-d})}.$$

If a be one of the sides of a regular polygon of n sides, the area of the figure and the diameters of the circumscribed and inscribed circles are

$$\frac{na^2}{4}\cot\left(\frac{180°}{n}\right), \; a \div \sin\left(\frac{180°}{n}\right), \text{ and } a \div \tan\left(\frac{180°}{n}\right)$$

Tables connected with this subject are given in the [illegible]AR, and corresponding tables for [illegible] POLYGON[illegible]. For the method of measuring irregular areas, see QUA[illegible] the solids in SOLID[illegible]TURES, METHOD OF.

The whole of the measurement of the [illegible] depends upon the ratio of the circumference to the diameter, which [illegible] called π, and is 3·1415927 very nearly, or $\frac{22}{7}$ roughly, or $\frac{355}{113}$ very nearly. [ANGLE.] So many simple derivations from this number are practically useful, that we shall give a table of them, accompanied by their logarithms, first giving a method of multiplying and dividing by π, which is a correction of the use of $\frac{22}{7}$. To multiply by π, multiply by 22 and divide by 7; from the result take one-eighth of the hundredth part of the multiplicand as a correction; the result is too great only by about its 200,000th part. To divide by π, multiply by 7, divide by 11 and 2, and to the result add the eighth part of the thousandth part of the dividend; the result is too small by very nearly its 100,000th part.

The table just referred to is as follows:—

	Number.	Logarithm.
π	3·1415927	0·4971499
$\pi : 2$	1·5707964	0·1961199
$\pi : 4$	·7853982	9·8950899
$\pi : 6$	·5235988	9·7189986
$\pi : 8$	·3926991	9·5940599
$\pi : 12$	·2617994	9·4179686
$4\pi : 3$	4·1887902	0·6220886
2π	6·2831853	0·7981799
4π	12·5663706	1·0992099
$1 : 6\pi^2$	·01688686	8·2275490
$1 : \pi$	·3183099	9·5028501
$4 : \pi$	1·2732395	0·1049101
$1 : 4\pi$	·0795775	8·9007901
π^2	9·8696044	0·9942997
$\sqrt{\pi}$	1·7724539	0·2485750
$\sqrt[3]{\pi}$	1·4645919	0·1657166
$\sqrt{(1:\pi)}$	·5641896	9·7514251
$\sqrt{(4:\pi)}$	1·1283792	0·0524551
$\sqrt{(1:4\pi)}$	·2820946	9·4503951
$\sqrt[3]{(6:\pi)}$	1·2407010	0·0936671
$\sqrt[3]{(3:4\pi)}$	·6203505	9·7926371
Hyp. log. π	1·1447299	0·0587030

To find the circumference from the diameter, multiply by π; to find the diameter from the circumference, multiply by $1:\pi$; to find the area from the diameter, multiply the square of the diameter by $\pi:4$; to find the area from the radius, multiply the square of the radius by π; to find the diameter from the area, multiply the square root of the area by $\sqrt{(4:\pi)}$; to find the area from the circumference,

multiply the square of the circumference by $1:4\pi$; to find the circumference from the area, multiply twice the square root of the area by $\surd\pi$; to find the ordinate perpendicular to a diameter, take the square root of the product of the segments into which it divides the diameter.

To find the area contained between two concentric circles, multiply the product of the sum and difference of the radii by π.

The arc of a circle and its subtended central angle are connected as follows: the arc which is equal to the radius subtends an angle of $57°\cdot3$ very nearly; or it may be easily remembered as 57 degrees and *three*-tenths of a degree, diminished by one-*fourth* of a minute and one-*fifth* of a second; being $57° 17' 44''\cdot8$, or $206264''\cdot8$. To find an angle from its arc (the radius being known), multiply the arc by $57\cdot3$, and divide by the radius; the result is too great by about three-quarters of its 10,000th part, and is in degrees and decimals of a degree. To find the arc from its angle, turn the angle into degrees and decimals, multiply by the radius, and divide by $57\cdot3$; the result is now too small by about three-quarters of its 10,000th part.

To find the area of a sector, find the arc (if only the angle be given), and multiply it by half the radius. To find the area of a segment contained between an arc and a chord, find the sector, and from it subtract the triangle formed by the terminal radii and the chord. [SEGMENT.]

To find the length of an arc, when the radius is not known, measure the chord of the arc, and the chord of its half; from eight times the chord of the half subtract the chord of the whole, and take one-third of the remainder. For an arc not exceeding 60 degrees, the error is less than the 7000th part of the whole.

The preceding are the principal rules of mensuration, of which the necessity occurs in the elementary parts of the subject: those which remain are connected with solid geometry, and the most essential [illegible] follows:

The number of cubic units in the content of a rectangular solid (or parallelepiped; there is no shorter term for this [illegible]mentary form of solid figure) is the product of the number of linear units in its three adjacent sides. The content of a prism or cylinder is the product of the number of square units in its base and the number of linear units in its altitude. The content of a pyramid or cone is one-third of the base multiplied by the altitude. The surfaces of a prism or pyramid must be found by computing those of their several faces. The surface of a common cylinder (not including the bases) or of a right prism is the circumference of the base multiplied by the altitude; that of a common cone is half the product of the circumference of the base and the slant side.

The following formulæ relate to the sphere. To find the surface from the radius, multiply the square of the radius by 4π, or the square of the diameter by π; to find the content from the radius, multiply the cube of the radius by $4\pi:3$, or the cube of the diameter by $\pi:6$; to find the radius from the surface, multiply the square root of the surface by $\surd(1:4\pi)$, to find the diameter, multiply the square root of the surface by $\surd(1:\pi)$; to find the radius from the content, multiply the cube root of the content by $\sqrt[3]{(3:4\pi)}$; to find the diameter, multiply the cube root of the content by $\sqrt[3]{(6:\pi)}$; to find the surface from the content, multiply the cube root of the square of six times the content by $\sqrt[3]{\pi}$, to fine the content from the surface, multiply the square root of the cube of the surface by $1:6\surd\pi$. [SPHERE.]

For other formulæ and methods, the detached articles on the different subjects may be consulted; or Hutton's or Bonnycastle's elementary works on mensuration.

MENTHA PIPERI'TA (Peppermint), a plant common in many parts of Britain, but cultivated for medical purposes. The dried plant, which is more powerful than the fresh, is of a lively green, with a peculiar aromatic odour, and a pleasant camphor-like taste, at first burning, but at last causing an enduring sensation of cold in the mouth. The dried herb is used for the preparation of a distilled water, and of a volatile oil, from which oil spirits or essence of peppermint is prepared. Of the oil three varieties occur in commerce, the German, English, and American. Twenty pounds of the herb yield from four to six drachms; but if the flowers be also distilled, the same weight will yield four ounces. It is often adulterated with oil of turpentine, oil of marjoram, and absolute alcohol. When pure it is of a whitish yellow, yellow, or even green colour; odour very strong, taste burning, camphor-like, causing a sense of coldness in the mouth. The oil is at first limpid, but becomes thicker, like a fixed oil. European oil does not deposit a stearopten, but the American easily forms long colourless four-sided prisms, which possess the odour of the oil. The American oil is more soluble in alcohol than the German; specific gravity $0\cdot92$, but when rectified $0\cdot90$. The action on the human system of any of the preparations of mint is stimulant and antispasmodic. The oil is used to be added to drastic or griping purgatives, and in other cases. It proved of considerable utility in bringing about reaction in the collapsed stage of Asiatic cholera.

MENTHA PULE'GIUM (Pennyroyal), an indigenous species of mint, smaller than most of the others, and of which the entire herb, except the root, is officinal. The odour is strong and peculiarly aromatic; taste herbaceous and bitterish. It has a stimulant and antispasmodic property, similar to most mints, but is supposed to possess also a specific power over the uterus, which has been much over-estimated. A distilled water, a spirit, and volatile oil are prepared from it, as from the preceding species.

MENTHA VI'RIDIS (Spearmint), a plant of Britain, very much resembling M. piperita; the colour however is of a deep green. It is also frequently confounded with M. crispa, than which it has a stronger and more agreeable odour, but weaker than peppermint. It has not the aromatic odour of that plant, nor does it leave the sense of coolness in the mouth. From it are prepared a distilled water, a spirit, and a volatile oil, which are used as the former.

MENTZ. [MAINZ.]

MENU. [MANU.]

MENU'RA. [MÆNURA.]

MENYANTHES TRIFOLIA'TA (officinal part, the leaves), a plant common in our bogs, and hence called bog-bean, as its leaves resemble the common bean. The leaves are ternate, petiolate, and even when dried have a fine green colour, but are without odour; they possess an enduring bitter taste. One hundred parts of the fresh herb dry into thirty-nine; ten pounds of the dried plant yield two pounds and three-quarters of extract. It contains an extractive (Menyanthin), which Brandes says forms a white, transparent, and, when highly dried, pulverisable mass of an intense degree of bitterness. Trommsdorff says he obtained a yellowish brown, clear, very viscid, not pulverisable, bitter extract.

It is a tonic and febrifuge medicine of undoubted efficacy, but greatly neglected in the treatment of disease. The chief use said to be made of the large quantity annually collected is to substitute it for hops in brewing, a proceeding which is both illegal and detrimental to the beer, since, though bitter, it does not possess the aromatic quality of the hop.

MENZA'LEH, LAKE. [EGYPT.]

MENZIKOFF, PRINCE. [PETER THE GREAT.]

MEPHI'TES. [BADGER, vol. iii., p. 262; SKUNK.]

MEPHITIC AIR. [CARBONIC ACID.]

MEQUINEZ. [MAROCCO.]

MER. [LOIR ET CHER.]

MERCAPTAN, a compound of hydrogen, carbon, and sulphur, discovered by Zeise, and so called from its energetic action on binoxide of mercury (corpus *mercurium captans*). It is prepared by distilling a mixture of sulphovinate of barytes and a strong solution of protosulphuret of barium. A volatile liquid and water pass over into the receiver, while sulphate of barytes remains in the retort; the ethereal product floats on the water, and when removed and carefully distilled, it separates into thionic æther and mercaptan, the properties of which are, that it is a colourless liquid, has a penetrating alliaceous smell, and a peculiar sweetish taste; its specific gravity is $0\cdot842$, it boils at 144°, and remains fluid at 8°. Water dissolves it sparingly, but æther and alcohol unite with it in all proportions; it has no action on litmus paper. Acetate of lead, but not nitrate of lead, gives a plentiful yellow colour in the solutions of mercaptan. When added to binoxide of mercury, energetic action ensues, water is generated, and a colourless crystalline compound is formed; with bichloride of mercury a similar product is obtained, attended with the formation of hydrochloric acid.

According to Zeise, the ultimate composition of mercaptan is—

Six equivalents of hydrogen	6
Four equivalents of carbon	24
Two equivalents of sulphur	32
Equivalent . . .	62

He however considers it as a *hydruret* of a compound base which he calls *mercaptum*, presumed to consist of five equivalents of hydrogen 5, four equivalents of carbon 24, and two equivalents of sulphur 32 = 61.

When mercaptan is made to act upon potassium, *mercaptide* of potassium is formed, and one equivalent of hydrogen is evolved; the constitution therefore of mercaptum and mercaptan is analogous to that of cyanogen and hydrocyanic acid.

MERCATOR, GERARD (whose real name was Kauffman, of which *Mercator* is the Latin equivalent), was born at Rupelmonde in East Flanders, in the year 1512. He applied himself with great industry to the sciences of geography and mathematics, and was patronised by the emperor Charles V., and appointed, in 1559, cosmographer to the duke of Juliers. He gave his name to the method of geographical projection now usually employed in the construction of nautical maps, in consequence of his having first represented the meridians by equidistant parallel lines, and the parallels of latitude by straight lines at right angles to the meridian, but he did not know the distances which ought to separate these parallels. Nicholas Mercator is said to have discovered the law which regulates these distances; but the English mathematicians having refused to pay for the promulgation of his discovery by accepting a pecuniary challenge which he is said to have proposed to them, he died without communicating it even to his friends. The credit of first investigating the principles of that projection, and applying them to the purposes of navigation, appears to be due to Edward Wright. Gerard Mercator died at Doesburg, Dec. 2, 1594. His published works are entitled 'De Usu Annuli Astronomici,' Lo[illegible] 1552; 'Chronologia,' Cologne, 1568, fol.; 'Tabulæ Geographicæ,' Cologne, 1578, fol.; 'Harmonia Evangelistarum,' Doesburg, 1592, 4to. His maps were collected in one volume, 4to., in 1594; and another edition was published in 1623, containing 156 maps.

(Hutton's *Mathematical Dictionary*; Montucla, *Histoire des Mathématiques*; Robertson's *Dissertation on the Rise and Progress of Navigation.*)

MERCATOR, NICHOLAS (whose real name was Nicholas Kauffman), was born at Holstein, in Denmark, in 1640. At an early age he was engaged in a correspondence with some of the principal geometricians of Denmark, Italy, and England. In 1660 he came to England; and shortly after the formation of the Royal Society, he was elected a member of that body. The date of his death is uncertain. According to Dr. Hutton, it took place in England in the year 1690 (*Mathematical Tracts*), or in 1694 (*Mathematical Dictionary*); but, according to Weiss (*Biog. Univers.*), he died at Paris, February, 1687. The reputation of Mercator rests principally upon a method, of which he was the author, whereby the area of the spaces comprised between the hyperbola and its asymptote may be determined arithmetically to any degree of approximation required; and upon the application of this method to the construction of logarithmic tables. It had been shown, as early as the year 1647, by Gregory St. Vincent, and subsequently by Mersenne, that these areas, if they could be computed, would give the logarithms of the corresponding abscissæ measured along the asymptote. [LOGARITHMS.] It was also known that in the equilateral hyperbola whose semi-axis = $\sqrt{2}$, the relation between the ordinate and abscissa was expressed by the equation $y = \frac{1}{1+x}$; and Wallis had shown in his 'Arithmetica Infinitorum,' published in 1655, that if the equation of a curve be represented by $y = 1 + x + x^2 + x^3 +$, &c., its area would be correctly expressed by the infinite series $x + \frac{x^2}{2} + \frac{x^3}{3} +$, &c. Wallis however, although his attention had been particularly directed to the subject, did not observe the almost obvious analogy between the equations $y = 1 + x + x^2 +$, &c., and $y = \frac{1}{1+x}$, as he could not have failed to do, had he chanced to perform the simple division indicated by the fraction $\frac{1}{1+x}$, for he would then have seen that the latter equation was identical with $y = 1 - x + x^2 - x^3 +$, &c. Mercator performed this division, and moreover describes the several steps of the operation with such minuteness, that one might almost suppose it to have been the first operation of the kind that had at that time been effected. He then proceeded to determine the required area, by considering it made up of a number of ordinates very near to each other, which method Kepler had previously employed in approximating to the area of a planet's orbit, and in this way he correctly inferred that the area corresponding to the abscissa $1 + x$, that is, the hyperbolic logarithm of $1 + x$, was $x - \frac{x^2}{2} + \frac{x^3}{3} -$, &c. These investigations were published by Mercator in 1668, in a work entitled 'Logarithmotechnia, sive methodus construendi logarithmos nova, accurata et facilis,' 4to., London. Wallis, who soon improved upon this method, says, when speaking of the work in a letter addressed to Lord Viscount Brounker, 'With this book, which has just appeared, I was so much pleased, that I could not quit it until I had completed its perusal. The doctrine by which the logarithms may be expeditiously constructed is perspicuously and ingeniously treated.' (*Phil. Trans.*, 1668.)

Mercator has been charged with dishonourably appropriating the discoveries of others, and with meanly withholding the publication of some which really belonged to him. [MERCATOR, GERARD.] In the 'Philosophical Transactions' for 1670, there is a paper by him, entitled 'Considerations concerning the Geometric and Direct Method of Signior Cassini for finding the Apogees, Excentricities, and Anomalies of the Planets,' besides which he has left the following works: [illegible]phia,' Danzig, 1651, 12mo; 'R[illegible] mathematicæ s[illegible] Copen., 1653, 4to.; 'De Emendatione Annuâ diatribæ duæ, quibus exponuntur et demonstrantur Cycli Solis et Lunæ,' 4to.; '[illegible] astronomica nova et consensus ejus cum observationibus,' Lond., 1664, fol.; 'Institutionum Astronomicarum libri duo,' Lond., 1676, 8vo.; 'Euclidis Elementa Geometrica,' Lond., 1678, 12mo.

(Hutton's *Mathematical Tracts*; Montucla, *Hist. des Mathem.*; *Biog. Univ.*)

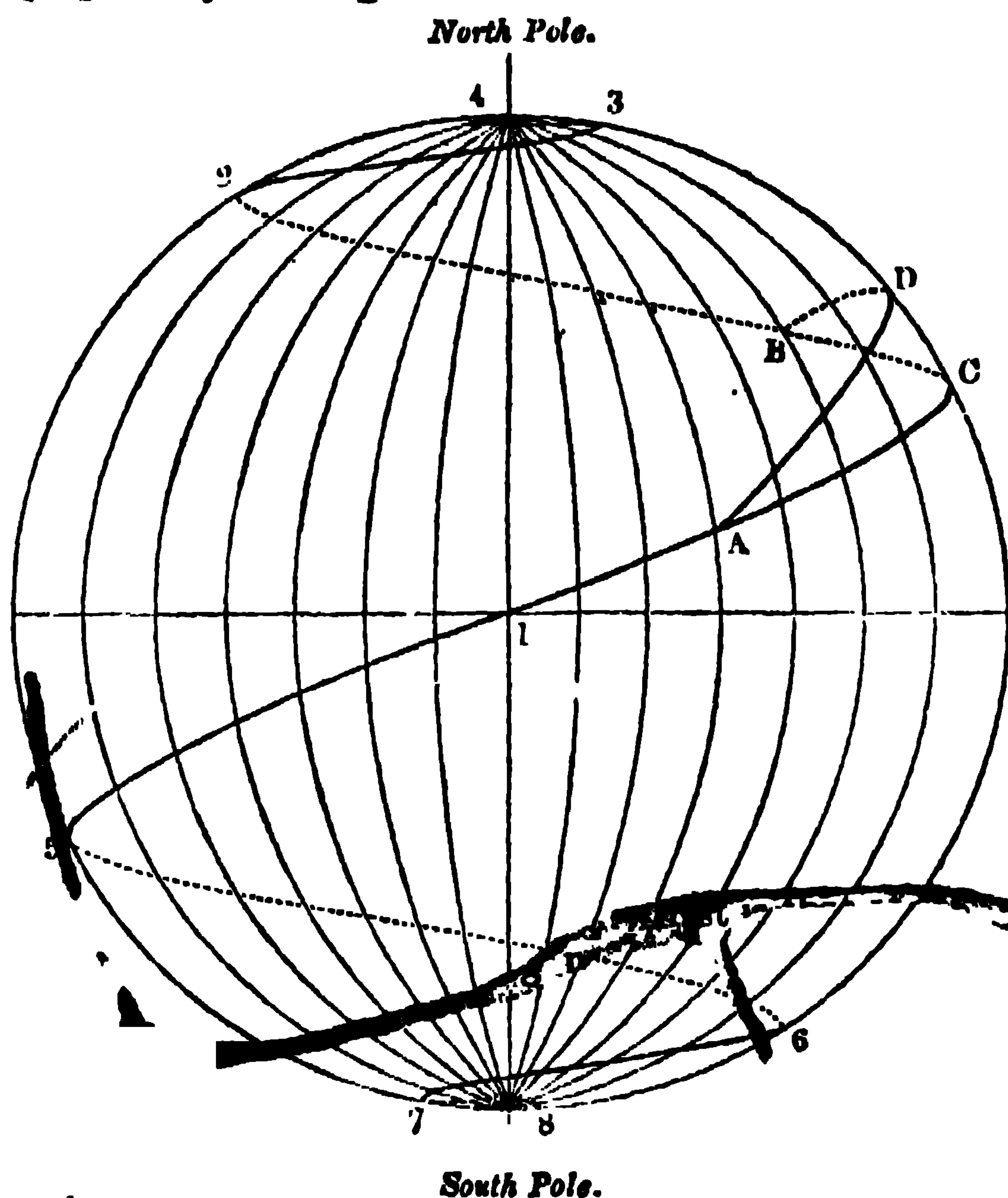
MERCATOR'S PROJECTION. It is our object in this article to endeavour to describe the projection, the use of which constitutes the principal difference between the methods of travelling by land and by sea, in such a manner as rather to give information to the landsman than the rules by which the mariner is guided. Perhaps there is no point of navigation on which a person who is neither a seaman nor a mathematician has so little chance of gaining any information from popular works.

We shall suppose the ship a mathematical point in comparison with the earth, and imagine the whole of the latter to be covered by sea. Also let the ship be always sailing before the wind, and no allowance for leeway or currents to be necessary. Throw out also the variation of the compass, that is, suppose the needle always to point due north.

A ship thus circumstanced, if it should continue sailing due north, would in time reach the north pole on a meridian circle of the sphere, on which, if it still kept its course, it would proceed due south, and would at last reach the south pole: such a ship would never change its longitude, except at the moment of passing either pole, when the longitude would alter at once by 180 degrees. If however the vessel sailed continually due east or due west, it would sail upon a small circle of the sphere, being always at the same distance from the pole, and always in the same latitude. In the first case the differences of latitude would give the distances sailed over, at the rate of 60 nautical miles to a degree; in the second case, the differences of longitude, reduced in the same way, and the results multiplied by the cosine of the latitude, would serve the same purpose.

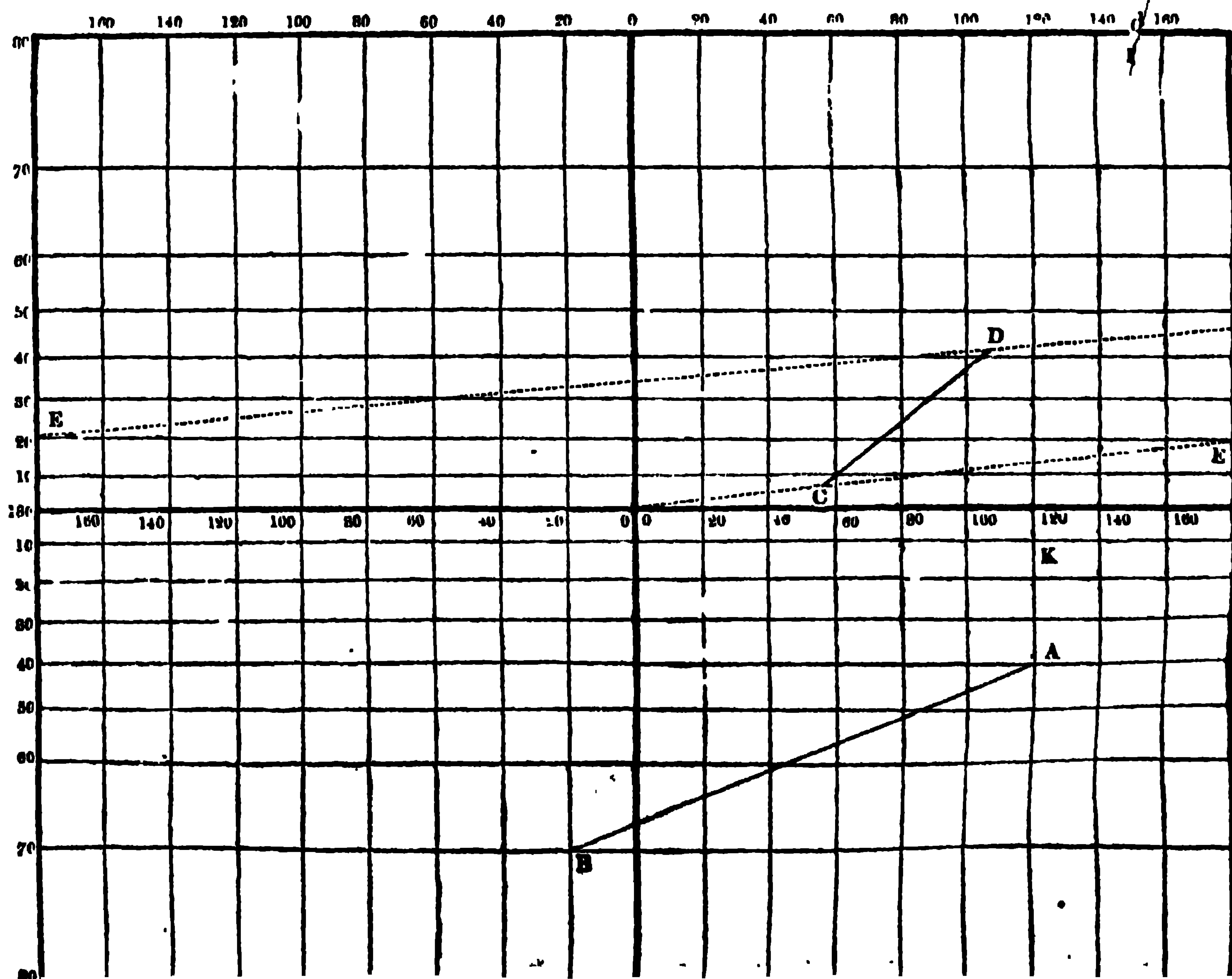
But suppose that the vessel took an intermediate course, say north-east. It would not sail on any circle of the sphere, great or small; for by hypothesis the line of the course is always making an angle of 45 degrees with the meridian; and there is no circle (unless it be the meridian itself, or a parallel of latitude, the equator included) which always makes the same angle with the meridian. Neither could the vessel, keeping such a course, reach the pole; for at the moment when it touches the pole, it is sailing north

whereas by hypothesis it is always sailing north-east. The fact is, that a curve which makes equal angles with all meridians must be a spiral which approaches the pole, encircling it with an infinite number of folds, but never actually reaching it, as in the following diagram, in which the curve 1, C, 2, 3, 4, &c., is that on which a ship would sail from 1 towards the north pole on a course east-north-east, and the curve 1, 5, 6, 7, 8, &c., is that of a course west-south-west towards the south pole. The dotted part of the figure is supposed to be on the other, or the invisible, side of the sphere. A ship sailing from A to B over A C B, keeps one course; but were it to sail over the great circle A D B, the course must be perpetually altering.



The spiral A C B is the only one on which a ship should sail directly from A to B, though there is an infinite number of such curves which pass through both A and B, the reason being, that in every other spiral except A B one or more complete circuits in longitude must be made, and the ship would come again to the meridian passing through A before it reaches B. In the same manner a spiral might be found, passing through A and B, which cuts the meridian of A five hundred times before it passes through B. Of course the shortest course is always preferred; and it is the object of Mercator's projection to lay down such a map of the world that the straight line joining two points shall be the map of the course which must be followed in order to sail from one to the other in the most direct manner, consistently with always keeping the same point of the compass.

The spirals above described are called loxodromic spirals, or rhumb lines, and under the latter term their mathematical properties are explained. Our present object is to turn the globe into one of Mercator's maps, in a manner which will give the unmathematical reader some idea of its construction. For this purpose suppose the map of the world to be painted on the globe, and let the globe be made of a thin and very elastic material. Let the elasticity of this material increase as we go towards either pole, and so rapidly that it becomes as great as we please at and near the poles. Let the equator E Q be immoveably connected with the internal centre (supposed fixed) of the globe. If then the north and south poles be pulled away from the equator, the thin membrane of the sphere will be extended; and if the pull be continued until the poles are sufficiently distant, a large portion of the sphere on each side of the equator will assume a cylindrical form, or one nearly cylindrical; and the greater elasticity of the upper parts will cause the small folds of the different spirals to be much more extended than the larger ones, so as to become equal to them. Let the mathematical hypothesis implied in the preceding be carried to its extreme limit, that is, let the poles be pulled to an infinite distance; and let the law of the elasticity be such, that the several loxodromic spirals shall have precisely similar successive folds on the resulting cylinder, that is, let them take a regular screw-like form. The meridians will then become straight lines parallel to one another; and if the membrane be then fixed in its cylindrical shape, that is, if it loses its elasticity, and if one of the meridians be slit all the way down, and the cylinder unrolled into a plane, we shall have before us Mercator's projection, as shown in the following diagram. The degrees of longitude remain everywhere the same, [illegible] latitude increase sensibly. The map goes up to 80° of [illegible] and any part of the remaining 10° might be drawn; but no space would be sufficient for the whole of the remainder. Any two points, A and B, being given, the line A B joining them points out, on the supposition that all the meridians look towards the north, the most direct course on which a ship can sail from one to the other: if a compass were placed



at A, then A B would show, A K being the north direction, the point of the compass on which to steer. Again, from C to D the most direct course is on the dark line C D; but C E, E D, is another way of coming to the same point. It must be remembered that the extreme lines of the right and left represent the same meridian, as they coincided before the cylinder was divided for the purpose of being unrolled.

It thus appears that we have a map on which the sailing course between any two places is found by simply drawing a right line. Another advantage, depending upon the nature of the rhumb line however, and not on the projection, is the simplicity of the rule by which the distance sailed can be determined. This is pointed out in RHUMB-LINE.

The preceding is Mercator's projection of the whole 360 degrees of longitude up to 80 degrees of latitude. A chart, as in other cases, is a part of the projection, enlarged to a convenient size.

MERCENA'RIA, Schumacher's name for the *Venus mercenaria* of authors, which passes current as money, under the name of Wampum, among the Indians of North America. [VENERIDÆ.]

MERCIA. [ENGLAND.]

MERCURY, or QUICKSILVER. This metal, which possesses the remarkable property of being fluid at usual temperatures, has been known from the remotest ages. Although it is met with in very large quantity, yet the mines occur in comparatively few places; those of Almaden in Spain, and Idria in Carniola, are the most important. There are however mines of this metal in Hungary, Transylvania, and the district of Deux Ponts in Germany. Mercury has been obtained for a very long time in China and Japan, and although the amount of the produce is unknown, there is every reason to think it is considerable; it is also found at Huancavelica in Peru.

Mercury is always obtained fr[illegible] cinnabar, which [illegible] bisulphuret of the metal; it is [illegible] in the red-sandstone associated with coal at Almaden; sometimes, as in the district of Deux Ponts, the cinnabar occurs in the subordinate porphyries; and at Idria [illegible] is found in the subordinate bituminous schist, but ra[illegible]y in limestone itself.

The cinnaba[illegible] [illegible]ich is found in coal-sandstone is often accomp[illegible] with argillaceous and bituminous schist, and [illegible] with fishes and plants; often with combustible fossils, and sometimes even intimately mixed with coal.

Pliny states ([illegible]xxiii. 7) that Callias, an Athenian, discovered the preparation of vermilion, or cinnabar, B.C. 505. He also mentions the mines of Almaden [ALMADEN] as producing in his time 10,000 Roman pounds annually; but this was not the amount which the mines could have produced, for the supply was purposely limited. Le Play, a French geologist, who visited Almaden in 1833, describes the mines as being richer than at any former period, furnishing annually nearly 2,244,000 pounds of mercury. About 700 workmen are employed underground, and 200 in the operations connected with the extraction of the metal from the ore at the surface.

Formerly mercury was imported in packages of fifty or sixty pounds weight; the metal was poured into a fresh sheep-skin, from which the wool was taken off, the ends were tied tight, and the sort of bag thus made was enclosed in a second skin, and that in a third, and three or four bags were packed in close barrels. Of late years however mercury has been brought to this country in wrought-iron bottles.

Various processes are adopted for the purpose of separating the mercury from the ore, all of which depend upon the volatility of the metal, its conversion into vapour in distilling vessels or retorts, and its condensation by cold. In order to separate the sulphur from the metal, either iron or lime may be employed; the first forms sulphuret of iron, and the latter of calcium, with the sulphur, and the metal is thus set free, volatilized, and condensed. The retorts employed are made of cast or sheet iron, or earthenware.

According to Dumas the following mines yield annually the annexed number of quintals of mercury (a quintal is 108 lbs. avoirdupois nearly):—

Almaden	25,000	to	32,000
Idria	6,000		10,000
Hungary } Transylvania }	700		700
Deux Ponts	400		500
Palatinate	180		200
Huancavelica	3,000		3,000
	35,280		46,400

We may perhaps reckon the average at about 2000 tons.

The properties of mercury are, that it is fluid, of a silvery white colour, and possesses a high degree of lustre; it is inodorous, tasteless, unacted upon or very slightly by exposure to air at common temperatures, and not at all by water at any temperature. The specific gravity of mercury is about 13·568. It boils at 670°; the density of its vapour is 6·976; and yet, as shown by Priestley, it vaporises at common temperatures, and Faraday has confirmed the observation. At 40° below Zero, mercury becomes solid, crystallizes in octohedrons, and gives a dull sound like lead; at the moment of congelation it contracts considerably; for while its density at 47° is 13·545, that of frozen mercury is 15·612; when in this state it is malleable, and may be cut with a knife.

Mercury is a good conductor of electricity and of heat, but its capacity for heat is extremely small; it expands uniformly at all temperatures between its boiling and freezing points. When mercury is pure it assumes the spherical form in small portions, but when it contains other metals, it forms into long striæ; a very minute admixture is sufficient to produce this effect; when thus impure it must be subjected to distillation, by which the mercury is volatilized, and the metals mixed with it remain; or it may be purified to a considerable extent from the more oxidizable metals by agitation with dilute nitric acid.

ORES OF MERCURY.—*Native Mercury.*—This occurs in but few places, and is met with in small cracks or crevices of the rocks in which the common ore occurs, and is frequently accompanied by red silver.

The principal localities are Almaden in Spain, and Idria in Carniola; some is also met with in the Palatinate.

Chloride of Mercury (*Horn Mercury; Baumerite; Mu*[illegible] *of Mercury*) [illegible] crystallized and in tubercular crusts. Primary form a square prism. Cleavage parallel to the lateral faces and the diagonal planes of the primary form; the latter are the more brilliant. [illegible] conchoidal. Hardness 1·0 to 2·0. Readily scratched with the knife. Colour pearl grey, or yellowish grey. Lustre adamantine. Translucent. Specific gravity 6·482.

Heated by the blow-pipe, it is entirely volatilized, and it yields by analysis

Chlorine	14·89
Mercury	85·11
	100·

Occurs principally at Moschelandsberg in Deux Ponts, but is also met with in Spain, Bohemia, and the Palatinate

Cinnabar; Vermilion; Bisulphuret of Mercury.—This is the common ore of the metal. Occurs crystallized and massive. Primary form of the crystal an acute rhomboid. Cleavage easy, parallel to the lateral faces of a regular hexhedral prism. Fracture conchoidal. Hardness 2·0 to 2·5. Colour carmine red. Lustre adamantine, approaching metallic. Opaque, translucent, transparent. Specific gravity 8·098.

Heated by the blow-pipe, whitens a piece of copper held over it. Unacted upon by nitric or hydrochloric acid, but readily by a mixture of them.

It occurs in the places which have been mentioned; as Almaden, Idria, &c.

Massive Varieties.—Amorphous. Structure granular, compact. Fibrous and pulverulent.

Analysis by Klaproth:—

Sulphur	14·25
Mercury	85·
	99·25

Native Amalgam.—Occurs crystallized and massive Primary form a cube. Cleavage indicating the form of a rhombic dodecahedron. Fracture conchoidal. Hardness 3·0 to 3·5. Scratches gypsum; is scratched by fluor-spar. Colour silver white. Lustre bright metallic. Opaque. Specific gravity 14·119.

When heated by the blowpipe, the mercury is volatilized, and the silver remains in the metallic state.

Analysis by

	Klaproth.	Cordier.
Mercury	64	72·5
Silver	36	27·5
	100	100·

Massive Variety.—Amorphous. Structure compact. Sometimes semi-fluid by mixture with excess of mercury. Found in France, Spain, Sweden, Hungary, the Palatinate, &c.

Iodide of Mercury occurs in spots of a fine lemon-yellow colour in the variegated sandstone of Casas Viejas, Mexico. When exposed either to the air or ammonia it becomes black.

GASEOUS COMBINATIONS.—We now proceed to consider the action of the elementary gaseous bodies upon this metal.

Oxygen and Mercury combine to form two compounds, the protoxide and binoxide; they have however but little affinity for each other, and it is doubtful whether any combination takes place between them, even when the metal is exposed to and long agitated with moist air at common temperatures. The protoxide of mercury may be formed in several modes: when, for example, potash, soda, or lime-water is added to a solution of protonitrate of mercury, or to protochloride of mercury, protoxide of mercury is separated. Its properties are, that it is nearly black, insoluble in water and the alkalis, but dissolves readily in nitric acid; it decomposes and is decomposed by hydrochloric acid, water and protochloride of mercury being formed. With sulphuric acid it forms an insoluble salt. It is totally volatilized by heat; and even by being kept out of the action of light is apt to separate into mercury and peroxide. It is directed to be prepared in the London Pharmacopœia under the name of *hydrargyri oxydum.*

Protoxide of mercury is composed of—

One equivalent of oxygen	.	8
One equivalent of mercury	.	202
Equivalent	.	210

Binoxide or Peroxide of Mercury.—This may be prepared by several processes; the simplest is that of exposing the metal nearly at its boiling point to the action of atmospheric air; it then absorbs oxygen, and is converted into a dark red crystalline substance, formerly used in medicine under the name of *Mercurius præcipitatus per se.* It is inodorous, acrid to the taste, and is said to be slightly soluble in water. At a red heat it is decomposed, the mercury returns to the metallic state, and oxygen gas is evolved; the nitric, hydrochloric, and some other acids readily dissolve it, and the solutions formed are decomposed by potash, hydrated binoxide of mercury of an orange colour being precipitated.

This oxide may also be procured by dissolving mercury in nitric acid, and decomposing the nitrate formed, by the action of heat; and also by decomposing the bichloride of mercury by the addition of potash to the solution. As procured by the former of these modes it is called in the London Pharmacopœia *hydrargyri nitrico-oxydum;* it has a bright red colour and a crystalline appearance: when obtained by decomposing the bichloride of mercury it is less brilliant, and is more of an orange colour, and is the *hydrargyri binoxydum* of the Pharmacopœia.

Binoxide of mercury is composed of—

Two equivalents of oxygen	.	16
One equivalent of mercury	.	202
Equivalent	.	218

Azote and Mercury, and *Hydrogen and Mercury,* do not combine.

Chlorine and Mercury form two compounds of very great importance in a medicinal point of view, the chloride or protochloride being the substance usually called calomel, and the perchloride or bichloride that which is commonly termed corrosive sublimate.

Chloride or Protochloride of Mercury (Calomel) may be obtained in several ways: 1st, by heating the metal in the gas; the residue, after washing, is the protochloride; 2nd, by adding a chloride, as common salt, to a solution of protonitrate of mercury, in which case the chloride of mercury is precipitated; 3rd, by adding the protoxide of mercury to hydrochloric acid, the results are chloride of mercury and water; lastly, there is the process of the Pharmacopœia, which is the best, and this consists in heating together common salt, mercury, and its bipersulphate; the results are, that when submitted to sublimation sulphate of soda remains, and the chloride of mercury formed is vaporized and condensed. It is the *hydrargyri chloridum* of the Pharmacopœia. The properties of chloride or protochloride of mercury are, that when procured by precipitation it is a white pulverulent substance, whereas that obtained by sublimation is crystalline, hard, and dense; its specific gravity is 7·175; it is colourless, inodorous, insipid, and sometimes regular crystals are observed, the primary form of which is a square prism; by long exposure to light it becomes of a rather dark colour, owing to incipient decomposition. It is quite insoluble in water, not readily acted upon by dilute acids, and is decomposed by lime-water, potash, and soda, protoxide of mercury being separated. It is totally volatilized by heat.

Protochloride of mercury is composed of—

One equivalent of chlorine	.	36
One equivalent of mercury	.	202
Equivalent	.	238

Bichloride or Perchloride of Mercury (Corrosive Sublimate) may also be formed by several processes. When, for example, the metal is heated in the gas, the soluble portion resulting from their action is bichloride of mercury; it may be formed by dissolving the binoxide in hydrochloric acid, the results being water, and the bichloride, which crystallizes when the solution is sufficiently evaporated; lastly, it is best formed by the process of the Pharmacopœia, which consists in heating a mixture of chloride of sodium and bipersulphate of mercury, by which sulphate of soda and bichloride of mercury are formed; the latter rises in vapour, and is condensed in the upper and cool part of the apparatus.

The properties of bichloride of mercury, the *hydrargyri bichloridum* of the Pharmacopœia, are, that it is a white semi-transparent crystalline mass, and perfect crystals are occasionally obtainable, the primary form of which appears to be a right rhombic prism. This substance is inodorous, its taste is nauseous and acrid, and it is a violent poison. Its specific gravity is 5·200; water at 60° dissolves rather more than one-twentieth, and boiling water one-third of its weight. Light has no action upon this salt, but it partially decomposes the aqueous solution, chloride of mercury being precipitated. It is more soluble in alcohol, æther, hydrochloric acid, and solution of hydrochlorate of ammonia, than in water. It is totally volatilized by heat. Lime-water, potash, and soda, added to a solution of the salt, precipitate yellow hydrated binoxide of mercury; but carbonate of lime decomposes it only partially, a deep red-coloured crystalline substance being thrown down, which is oxychloride of mercury. Ammonia throws down a white precipitate, which is called in the Pharmacopœia *hydrargyri ammonio-chloridum.*

Cyanogen and Mercury combine to form one compound, which is a bicyanide; it is prepared by boiling together in water, Prussian-blue and binoxide of mercury, which act upon each other though neither is soluble. By evaporating the solution the bicyanide is obtained in colourless crystals, the primary form of which is a right square prism; this salt has a metallic taste, is poisonous, much more soluble in hot than cold water, and but sparingly taken up by alcohol. By heat it is decomposed, and cyanogen gas is obtained. Nitric acid dissolves it without decomposition, but it is decomposed by sulphuric acid, and also by hydrochloric acid, which evolves hydrocyanic acid, with the formation of bichloride of mercury. The affinity between cyanogen and mercury is so strong, that its solution, unlike that of any other mercurial compound, is not decomposed by the alkalis; but hydrosulphuric acid and the hydrosulphates readily produce this effect. It is contained in the London Pharmacopœia.

Bicyanide of mercury is composed of

Two equivalents of cyanogen	.	52
One equivalent of mercury	.	202
Equivalent		254

Fluorine and Mercury.—When hydrofluoric acid is added to a solution of protonitrate of mercury, no precipitation takes place, and it does not appear that a protofluoride of the metal has been yet obtained. If however the acid be added to binoxide of mercury, an orange-coloured compound is formed, which is soluble in water, and the solution by evaporation yields yellowish prismatic crystals, which appear to be perfluoride of mercury.

Bromine, the only elementary fluid known except mercury, unites with it to form two compounds.

Bromide or Protobromide of Mercury is procured by mixing solutions of bromide of potassium and protonitrate of mercury; a white curdy precipitate is obtained, which is insoluble in water.

Bibromide of Mercury is prepared by treating the metal with bromine and water. This salt is soluble in water, and the solution yields colourless crystals, which are dissolved by alcohol; this salt is decomposed by nitric and sulphuric acids. Neither of these salts is applied to any particular use.

SOLID COMBINATIONS.—*Non-metallic elementary solids and Mercury* mostly combine, but—

Carbon and Mercury do not form any compound.

Sulphur and Mercury unite in two proportions, forming the sulphuret or protosulphuret and the bi-sulphuret or persulphuret of mercury. When sulphur and mercury are triturated together they form a black mixture, which is used in medicine, and was formerly called *Æthiops mineral;* this however is not a definite compound of the elements.

Protosulphuret of Mercury is easily obtained by passing a current of hydrosulphuric acid gas into a solution of protonitrate of mercury; a black powder is precipitated, which is insoluble in water, totally volatilized at a high temperature, and is by nitric acid converted into a sulphate. It consists of—

One equivalent of sulphur	.	16
One equivalent of mercury	.	202
		—
Equivalent	.	218

Bisulphuret of Mercury; Cinnabar; Vermilion.—It has been already stated that this is the principal ore of mercury. It is procured artificially by heating sulphur with eight times its weight of mercury in an iron vessel; the compound formed is then subjected to sublimation. The sublimate is a compact, deep red, crystalline mass, which, when reduced to powder, is of a beautiful scarlet colour. It is inodorous, insipid, insoluble in water, and unalterable by exposure to the air; it is totally vaporised by heat, and is decomposed when heated with some of the metals, and also by distillation with lime, potash, or soda.

When heated with sulphuric acid, sulphurous acid is evolved, and a sulphate of mercury is formed; it is insoluble either in nitric or hydrochloric acid, but when they are mixed the nascent chlorine which is evolved decomposes and dissolves the bisulphuret, even without the assistance of heat.

Bisulphuret of mercury is composed of

Two equivalents of sulphur	.	32
One equivalent of mercury	.	202
		—
Equivalent		234

Phosphorus and Mercury may be made to combine by heating phosphorus with the oxide or protosulphuret of mercury, by passing it in vapour over the protochloride, or phosphuretted hydrogen, into a solution of protonitrate of mercury. It is an insoluble substance, and has a black or brown appearance, which is modified by the mode of its preparation.

Iodine and Mercury form two compounds, and they may be formed in two modes: first, by the mere trituration of the equivalents with a little spirit of wine in a mortar; and secondly, by adding a solution of iodide of potassium to one of protonitrate of mercury to obtain the protiodide, and of pernitrate of mercury to prepare the biniodide. The former method is adopted in the Pharmacopœia.

Protiodide of Mercury is a greenish-yellow powder, devoid of smell, and insoluble in water. By the agency of light or of heat it is apt to be resolved into mercury and biniodide, but when quickly heated it sublimes unchanged.

Iodide or protiodide of mercury is composed of

One equivalent of iodine	.	126
One equivalent of mercury	.	202
		—
Equivalent		328

Biniodide of Mercury, especially when prepared by precipitation, is of a fine red colour, approaching to scarlet; it fuses readily, and sublimes in rhombic scaly crystals, which are at first yellow, but become red on cooling. Water does not act upon it, but it is soluble in alcohol when heated, and also in some acids.

It is composed of

Two equivalents of iodine	252
One equivalent of mercury	202
	—
Equivalent	454

Selenium and Mercury. The protoseleniuret is a tin-coloured compound, which sublimes in shining scales: the biseleniuret is obtained by fusing the protoseleniuret with selenum; it is a grey crystalline mass.

Metals and Mercury, or the greater number of them, readily combine; other metallic compounds are termed alloys, but those which contain mercury are called amalgams. [AMALGAMS.]

ACIDS AND MERCURY.—The action of acids on this metal, like that which they exert on others, is various, and of course depends upon the nature of the acid and the power of the metal in attracting oxygen.

Nitric Acid and Mercury.—It is a well-known fact that concentrated nitric acid acts upon very few metals, and it is curious that although the affinity between mercury and oxygen is extremely weak, yet this metal decomposes nitric acid and attracts its oxygen, even at common temperatures: the fluidity of the metal is probably the cause of this facility of action. A solution of pernitrate of mercury is thus obtained, which, if it crystallize at all, does so with great difficulty; for the solution may be evaporated to the sp. gr. 2·00 without yielding crystals.

Protonitrate of Mercury, that is, nitrate of the protoxide, is readily obtained by adding excess of the metal to the dilute acid. Action readily takes place, and crystals are formed with great readiness. There is no protoxide of any metal which forms so many nitrates as that of mercury; they are at present very imperfectly known, and require analysis.

The crystallized protonitrates of mercury are mostly decomposed by water, a subprotonitrate being precipitated in an insoluble state.

It has already been observed that the pernitrate of mercury can scarcely be obtained in a crystalline form.

Hydrochloric Acid and Mercury do not act upon each other under any circumstances; when however the protoxide is added to the acid, protochloride of mercury and water are formed; while with the binoxide of mercury water and the bichloride are procured.

Sulphuric Acid and Mercury do not act on each other without the assistance of heat; with it, the acid is decomposed, and the metal converted into binoxide, and bipersulphate of mercury is formed.

Protosulphate of Mercury is procured by adding sulphuric acid or a sulphate to protonitrate of mercury; a white insoluble compound is precipitated, which is not applied to any use, and which consists of

One equivalent of sulphuric acid	.	40
One equivalent of protoxide of mercury		210
		—
Equivalent		250

Bipersulphate of Mercury, obtained, as just described, by heating together the acid and metal, is a colourless salt, which, when mixed with water, is decomposed, and sulphuric acid remains in solution, while a yellow precipitate is obtained, formerly called *turpeth mineral.*

The bipersulphate of mercury is composed of

Two equivalents of sulphuric acid	.	80
One equivalent of binoxide of mercury		218
		—
Equivalent		298

Turpeth mineral is a subsulphate of the binoxide of mercury, composed of

Three equivalents of sulphuric acid	120
Four equivalents of binoxide of mercury	872
	—
Equivalent	992

Bipersulphate of mercury is not directly applied to any purpose, but the formation of it is one of the steps in the process of preparing calomel and corrosive sublimate in the Pharmacopœia.

Carbonic Acid and Mercury do not, under any circumstances, act on each other. When an alkaline carbonate is added to a solution of protonitrate of mercury, a precipitate is obtained, which, on drying, does not appear to contain any carbonic acid, so that a protocarbonate of mercury does not appear to be capable of being formed.

Percarbonate of Mercury may however be obtained by

mixing solutions of carbonate of soda and pernitrate of mercury; the precipitate, when dry, is of an ochre-yellow colour, and appears to be a dicarbonate, composed of

Two equivalents of binoxide of mercury	436
One equivalent of carbonic acid .	22
Equivalent	458

Phosphoric Acid and Mercury.—The protophosphate is formed when phosphate of soda is added to a solution of protonitrate of mercury; a white crystalline precipitate falls, which is insoluble in water, or in excess of phosphoric acid; it is decomposed by heat, which expels the mercury and leaves the acid.

Perphosphate of Mercury is thrown down by phosphate of soda from the pernitrate; in appearance it does not differ much from the protophosphate, but, unlike it, is dissolved by excess of acid.

Fulminate of Mercury is a detonating compound, which was discovered by Mr. Howard; it is prepared in an indirect mode by dissolving mercury in nitric acid, and adding alcohol to the solution; when the effervescence is over, a greyish crystalline precipitate is obtained, which is to be washed with a small quantity of distilled water, and dried at a gentle heat.

The properties of fulminate of mercury are, that it explodes with considerable violence when heated to about 300°, and the explosion is accompanied with a bright flame; friction, the electric spark, sulphuric and nitric acids, also cause it to explode; the results of it are, azotic gas, carbonic acid gas, and a little ammonia. It appears to consist of

One equivalent of fulminic acid .	34
One equivalent of protoxide of mercury	210
Equivalent	244

Acetate of Mercury.—The protoacetate is the only which has been employed, and it is now indeed nearly fallen into disuse. It is prepared either by dissolving protoxide of mercury in acetic acid, or by mixing solutions of acetate of soda and protonitrate of mercury. This salt has a pearly lustre, is formed in crystalline flakes, dissolves sparingly in water, and is insoluble in alcohol. Its taste is acrid.

It is composed of

One equivalent of acetic acid . .	51
One equivalent of protoxide of mercury	210
Equivalent	261

SALTS.—Having now stated the nature and composition of the more important compounds of mercury, we shall state the general properties of its salts, which, according to Professor Brande, are as follows:—

The soluble salts of the protoxide are mostly white, of a metallic taste, and not virulently active as poisons. Some of them, when neutral, are resolved by water into basic and acid salts. Phosphorous and sulphurous acids, and protochloride of tin, precipitate metallic mercury: the caustic alkalis throw down a black powder; the carbonated alkalis, yellow or brown; the phosphates, white, even in very dilute solutions; sulphuretted hydrogen and the hydrosulphurets, black; hydriodic acid and the iodides, yellow; hydrochloric acid and the chlorides, white and curdy; the alkaline chromates, scarlet; ferrocyanide of potassium, white; the oxalates, white, even when very dilute; tincture of galls, brownish yellow.

The soluble salts of the peroxide or binoxide of mercury are mostly white when neutral, yellow when basic; they are poisonous, and nauseously metallic to the taste, and are often resolved by water into acid and basic salts. Copper throws down from them metallic mercury, and ammonia and carbonate of ammonia produce white precipitates; iodide of potassium, a scarlet-red; and infusion of galls, an orange precipitate. Unless in concentrated solution, they are not affected by hydrochloric or oxalic acids. The presence of organic substances interferes considerably with the appearances produced by some of the above tests; hence in cases of poisoning by corrosive sublimate peculiar precautions are sometimes required, and in all cases the precipitate should be collected and heated in a tube, if necessary, with a little white flux, or some reducing agent, so as to separate metallic mercury, the microscopic globules of which are easily sublimed and discerned. The insoluble mercurial salts are mostly volatilized at a red heat, and they are all decomposed, with the production of metallic mercury, when mixed with a little carbonaceous matter, and heated in a glass tube.

USES OF MERCURY.—The uses of mercury in the arts are numerous and important. It is used in the extraction of gold and silver from their ores, in gilding [GILDING], the silvering of mirrors, and in filling thermometers and barometers. Bichloride of mercury has been lately extensively used for the prevention of dry-rot; and lastly this metal is extensively employed in various forms in medicine.

MEDICAL PROPERTIES OF MERCURY.—In a purely metallic state mercury, when taken into the human stomach, produces no effects except such as are owing to its mechanical properties. Nevertheless it may become oxidized, and, by combining with some of the acids of the stomach, occasion violent disorder. Even its external application leads to similar results, from the metal first becoming oxidized, then absorbed, and producing the same effects as if taken by the mouth. The preparations of mercury differ very much in the degree of their action, both according to the nature of the combination, and also of the dose employed or the mode of administration. The milder preparations seem only to increase the natural and healthy actions of the organs of the body, particularly the secreting and exhaling organs; while the more active, if not given in very minute doses, destroy the texture and impair the function of many organs, both those with which they are brought into immediate contact, and others which they affect by sympathy or other means. No medicinal substance is capable of producing so much benefit, none is so frequently abused, or so fertile a source of injury, as mercury. Its mode of action is little understood, but its effects are often sufficiently obvious. A brief statement of the most important of these effects is all that can be given here.

When mercury, triturated with chalk or magnesia, or with confection of roses (which is the case when it is made into *blue* pill), is taken in moderate dose into the stomach, it does not seem to make any immediate sensible impression, unless that organ be in a state of morbid sensibility, when it is apt to cause heartburn, nausea, or disturbance of the bowels. It may be repeated at longer intervals, and the individual, especially if robust, appears to have an increased appetite and more ready digestion. This is more particularly the case when corrosive sublimate (bichloride of mercury) is given in very minute doses. Even the introduction of mercury into the body by friction over parts where the skin is thin, would seem to increase, for a time, the activity of the whole system. To whatever surface applied, the absorbents would appear to lay hold of it, and carry it into the circulating mass. Owing to peculiarity of constitution (idiosyncrasy) a very minute quantity of mercury produces in some individuals very striking effects, either violent salivation, disturbance of the bowels, or other inconveniences, accompanied by great debility. This result is quite distinct from the effects of an overdose of some of the more active forms, which produces actual poisoning, or from the effects of the too long continued administration of some of the mild preparations. Children, owing to the irritability of their bowels, are not so apt to be salivated as adults, and more mercury can be borne in warm than in cold countries.

When a single dose of mercury is given, it is generally one of the preparations which act on the bowels, either alone, or in combination with or followed by some other purgative medicine; and little permanent effect is observed: but repeated small doses, especially if hindered from passing off by the bowels, by combination with opium, excite arterial commotion, and end by establishing a febrile movement. The pulse is full and more frequent, the animal heat augmented, the secretion from the skin abundant; at last followed by thirst, restlessness, and sleeplessness. This disturbance frequently lasts some time, even after the medicine has been discontinued, and is occasionally accompanied with determination or congestion of blood either towards the lungs, abdomen, or brain, followed sometimes by hæmorrhage from various organs. Blood drawn during a mercurial course is generally found covered with a buffy coat, the same as is the case in inflammatory diseases. On the salivary glands the effects are most conspicuous: they become irritated, more sensible, turgid, and pour out abundant

saliva, which, on standing, deposits flakes of coagulated albumen. The breath at the same time acquires a peculiar fetor (called mercurial), the gums are swollen, but pale and tender, the teeth become loose, and the tongue and lining membrane of the mouth are covered with ulcers.

The general commotion of the system often proves a powerful agent in the cure of many diseases, but occasionally it becomes too great, and requires to be moderated. Not only must the exhibition of the mercury be suspended for a time, in such cases, but very plethoric persons must be bled, and put on the antiphlogistic plan even before beginning its use. The warm bath, diluent drinks, and a milk or farinaceous diet, with cool air, are proper means of lessening the violence of its action.

The effects just mentioned show the necessity of abstaining from its administration when there is a tendency to hæmorrhage (especially of the lungs), or a disposition to consumption, or if there exist a scrophulous constitution, or the person be affected with sea scurvy: also during certain states of the female system, and during pregnancy or suckling.

When the use of mercury is too long continued, or it is given in too strong doses, its stimulating action appears to fatigue the system, and to pervert the function of assimilation, both immediately in the blood, and also in the different organs and tissues. Hence the individual loses his muscular power, becomes pale, tumid, and puffy, or else greatly emaciated. The brain and spinal chord are irritated; the limbs exhibit involuntary tremblings, and all the tissues acquire a morbid susceptibility. The blood is found to be deteriorated, and to have lost its ordinary consistence, and the person appears to be affected with scurvy or consumption. The inconsiderate use of mercurial preparations, especially of corrosive sublimate, often occasions chronic inflammation of the stomach, causing indigestion, and alterations or thickenings of the coats of the stomach. Diseases of the brain not unfrequently result from an improper use of mercury. Lastly, a peculiar affection of the skin often occurs from the abuse of this substance.

In the treatment of diseases, four distinct effects may be obtained from the employment of mercurial preparations. 1st. By some of them the intestinal canal is irritated, and the expulsion of its contents occasioned. 2nd. Others are used to produce general commotion of the system, to rouse the lymphatics, and excite both the secreting and excretory glands. 3rd. To control or altogether change the action of the capillary vessels, when that is extreme, and tending to the effusion of serum, and more especially of coagulable lymph. With this may perhaps be joined the action of the mercury as an alterative. 4th. What is regarded as its specific effect in bringing about the cure of some peculiar diseases.

Calomel, or the protochloride of mercury, is the preparation most employed as a purgative; it influences the intestinal canal along its whole length, and excites the liver and other glands to secretion. It is of very great utility, not only at the commencement of fevers, but even during their course, either when given alone or in conjunction with some other purgative. It is not admissible if the tongue be very red and sensible, and a similar state of stomach be presumed to exist. In many eruptive fevers, especially scarlet fever, its early and even free employment is productive of the best results. In the yellow and many other fevers of hot climates it is indispensable. In these diseases mercury is introduced into the system by every means; and whenever the patient is salivated, recovery may be expected. In many of the less rapid fevers of Europe, the like benefit follows its use.

During the inflammatory and turgescent stage of hydrocephalus acutus, or water on the brain, calomel, alone or with digitalis, is frequently efficacious in saving the patient; at the same time other forms of mercury, especially the liniment, may be used. In the wasting or atrophy of children, the steady daily use of calomel and rhubarb produces the best results, if proper dietetical means be adopted.

These measures should at no time be resorted to, except under the direction of responsible medical attendants. The unnecessary use of mercury, when some other purgative would have answered as well, is much to be reprobated, and not only injures the constitution of children, but if they are teething at the time, it leads to the early decay of their teeth. (Bell *On the Teeth.*)

Persons under the influence of mercury, even when a single dose has been taken as a purgative, are very liable to take cold, especially from wet. This must be carefully guarded against. The bichloride of mercury (or corrosive sublimate) seems not to dispose the system so much to be hurtfully impressed by cold, and is therefore well suited to camp and navy practice. Besides, if given in sufficiently small doses, it is perhaps the best of all the preparations to use as an alterative, especially in cases of chronic inflammation or thickening of the tissues, such as the heart.

Mercury has a great power of checking the deposition of coagulable lymph, and controlling changes in the organic particles of bodies, both vegetable and animal. One of the most valuable uses of mercury is connected with this power of changing the action of the capillaries when that action is extreme, or when there is a tendency to pour out serum in excess, or effuse coagulable lymph. In some inflammations the action of the vessels is so violent as to pour out their contents, and this leads to obstructions or changes of structure which derange the functions, or even speedily occasion death. Thus in croup coagulable lymph is effused in the windpipe, obstructing respiration; in peritonitis, or inflammation of the outer lining of the intestines, lymph is poured out, agglutinating the folds of the intestines; in iritis the same happens, closing the pupil of the eye and destroying vision. In all these cases, after free venesection, or even without it, calomel given very freely will hinder further effusion, and even cause the absorption of what has already escaped from the vessels; as may often be seen when the iris of the eye is inflamed.

Many serious chronic diseases are removed by a judicious and persevering use of mercury, but these can neither be enumerated here, nor can even the most general rules be attempted to be laid down. (Holland, *Medical Notes*; *On Mercurial Medicines*; and Teale *On Neuralgic Diseases.*) The specific employment of mercury is still less suitable to be discussed here. It may be remarked however that the opinion for the necessity of giving mercury in any quantity is now altogether exploded.

It is not necessary to dwell on any of the other preparations of mercury, many of which are valuable, either alone or as additions to other substances. Calomel frequently greatly assists in promoting the action of other medicines, particularly diuretic medicaments. How far calomel, either in small frequently repeated doses or in very large ones, was really useful in Asiatic cholera cannot be ascertained. The employment of corrosive sublimate in the arts depends in some cases on principles explained above. Thus it checks fermentation, and opposes the formation of new compounds; hence, when applied in solution to timber, it prevents the dry-rot from occurring, by solidifying the albumen of the wood. [ANTISEPTICS.] In cases of poisoning by it, the antidotes most proper are those substances which contain albumen, such as white of egg, milk, flour, &c. [ALBUMEN.]

MERCURY, the planet nearest to the sun. Its orbit being entirely within that of the earth, it never recedes to the point of the heavens opposite to the sun, but is always found within 29° of the sun. Hence it is only visible to the naked eye in the evening, when it is to the east of the sun, and near to its greatest distance (or elongation) from the sun; so that the sun can descend sufficiently below the horizon to allow the planet to be seen just before its setting: similarly, it is only visible in the morning (before sunrise), when it is near its greatest elongation westward of the sun. The phases of Mercury are not visible without a telescope. The apparent diameter of Mercury varies from 5 to 12 seconds; the real diameter is ·398 of that of the earth, or about 3140 miles. Its bulk is to that of the earth as 63 to 1000; its mass is reckoned at the two-millionth part of that of the sun. It revolves on an axis, the inclination of which to the ecliptic is not determined, in $24^h\ 5^m\ 28^s{\cdot}3$. It has seven times the light and heat of the earth.

The transits of Mercury, or passages of the planet over the sun's disc, take place when the conjunction (the inferior conjunction, as it is called, Mercury being between the earth and the sun) happens at the time that the planet is near its node. These transits are not so useful in the determination of the sun's parallax or the longitude of the place of observation as those of Venus: we shall therefore refer the account of such transits in general to the latter planet. The following are, according to Delambre, the times of the

transits which will yet take place in the present century (civil time at Paris):—

1845	8 May, 8 P.M.		1878	6 May, 7 P.M.	
1848	9 Nov., 8 P.M.		1881	8 Nov., 1 A.M.	
1861	12 Nov., 7½ A.M.		1891	10 May, 3 A.M.	
1868	5 Nov., 7 A.M.		1894	10 Nov., 6½ P.M.	

Elements of the Orbit of Mercury.

Epoch, 1799, December 31, 12^h mean astronomical time at Seeberg.

Semiaxis major ·3870938, that of the earth being assumed as the unit.

Excentricity ·2041704; its secular increase (or increase in 100 years) ·0000039.

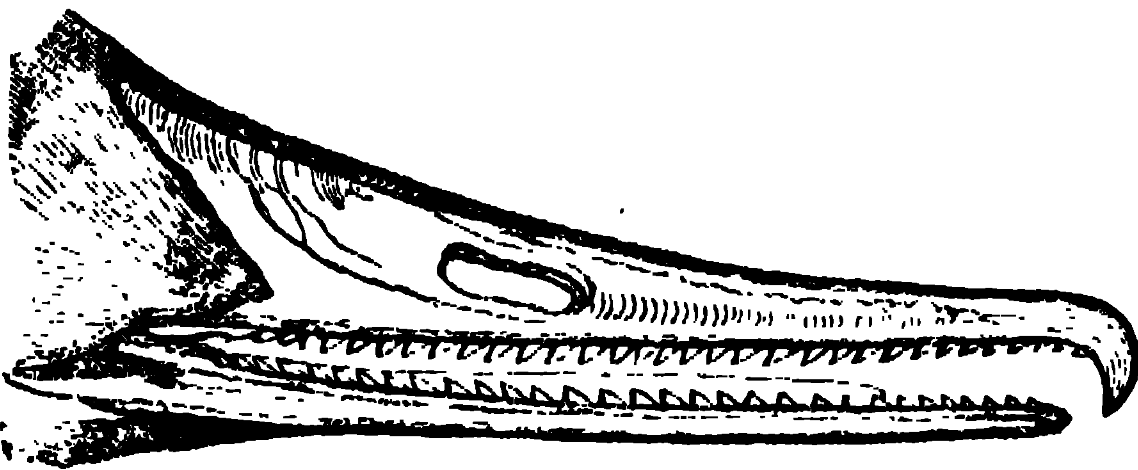
Inclination of the orbit to the ecliptic 7° 0′ 5″·9; its secular increase 18″·4.

Longitudes from the mean equinox of the epoch: (1.) of the ascending node, 45° 57′ 9″·0; its secular increase (combined with the precession), 4215″·1; (2.) of the perihelion, 74° 20′ 6″·0; its secular increase (combined with the precession), 5602″·9; (3.) of the planet (mean), 108° 4′ 48″·3.

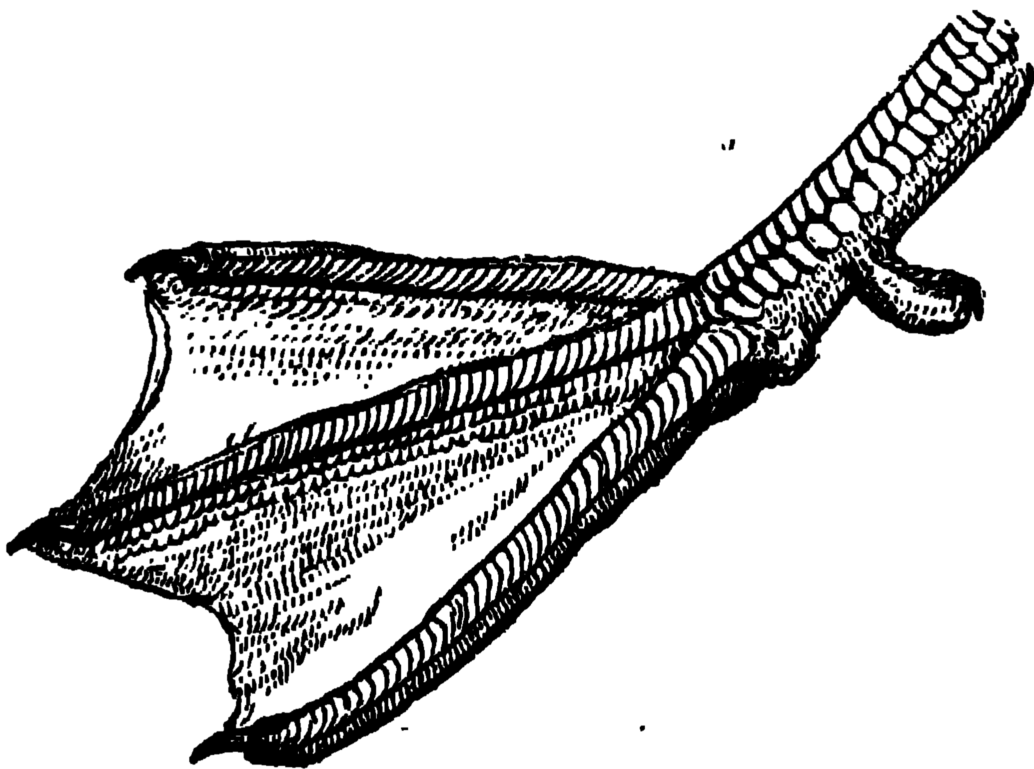
Mean sidereal motion in one mean solar day, 4° 5′ 32″·558; in 365¼ it is 53° 42′ 47″·65 more than 4 complete revolutions; sidereal revolution, 87·96926 mean solar days.

MERCURY, TRANSIT OF. [MERCURY; VENUS, TRANSIT OF.]

MERGANI'NÆ (*Merginæ*, Bonap.), a subfamily of *Anatidæ*, consisting of the genus *Mergus*, Linn., the *Goosanders* or *Mergansers* of the British. The Prince of Musignano makes it include two subgenera, Mergus (*Smew*) and Merganser, Leach (*The Goosanders*), and places the subfamily next to the *Fuligulinæ*, and immediately preceding the *Pelecanidæ*. The Linnean genus *Mergus* is placed between the last section (*Cristatæ*) of the great genus [illegible] and the genus *Alca* in the *Systema Naturæ*, and the position assigned to it by [illegible]ous authors will be found in the article [illegible] In the second volume of Mr. Swainson's *Classification of Birds*, the subfamily is placed after the *Fuligulinæ*, and immediately preceding the family *Colymbidæ*.



Bill of Merganser.



Foot of Merganser.

Generic Character.—Bill straight, narrow, and slender, subcylindrical anteriorly, wide at the base, and abruptly hooked at the tip; margins of both mandibles serrated, the serrations or teeth directed backwards. *Tongue* slender. Feet short, with the toes fully palmated, and placed behind the point of equilibrium.

The species are not numerous, and of these, *Mergi Merganser*, *Serrator*, *albellus*, and *cucullatus* are found in Europe. We select *M. Merganser* and *M. albellus* as examples.

Merganser. (Leach.)

Example, *Merganser Castor* (*Mergus Merganser* and *Castor* of Linnæus).

Description.—*Very Old Male.* Tufted head (the tuft large and thick), and part of the neck greenish black, the reflection varying in different lights; lower part of the neck, breast, belly, abdomen, coverts of the wings and scapulars farthest from the body, tinged of a yellowish rose colour* (which soon fades in stuffed specimens to white) on the under parts; upper part of the back and scapulars nearest to the body deep black; quills blackish; great coverts bordered with black; rest of the back and tail ash-coloured; beauty-spot on the wing white, without transverse bands; bill deep red, black above and on the terminal nail; iris reddish brown, sometimes red; feet vermilion red. Length 26 to 28 inches. (Temm.)

In this plumage the bird is the *Mergus Merganser* of Linnæus and others; *Le Harle* of Buffon and the French; the *Goosander* or *Merganser* of Latham and Pennant; *Gansen-säger* and *Taucher-gans* of Bechstein and the Germans; *Mergo, Oca marina e Mergo dominicano* of the 'Stor. degl. Ucc.,' and *Dubbelde Zaagbek* of Sepp. and the Netherlanders.

Female.—Tuft long and loose; head and part of the neck reddish brown; throat pure white; lower part of the neck, breast, sides, and thighs whitish ash; all the upper parts deep ash; beauty-spot of the wing white without any transverse band; bill faded red; iris brown; feet yellowish red, webs ashy-red. Length 24 or 25 inches.

Young Males of the Year: Similar to the females.

The Young at the age of one year are distinguished by blackish spots disposed on the white of the neck; the ruddy colour of the [illegible] terminated by a deeper colour; blackish plumes begin to show themselves on the top of the head, and white feathers appear on the coverts of the wings.

In this state the bird is the *Mergus Castor* of Linnæus and others; *Mergus rubricapillus* of Gmelin; the *Harle femelle* of Buffon; the *Dun Diver* or [illegible] *Fowl* of Latham and others; and the *Mergo oca* of [illegible] degl. Ucc.'

This species is the *Sugherone* of the Italians; the *Meerrack* and *See-Rack* of the Germans; *Wrakfogel*, *Kjorkfogel*, *Ard*, and *Skraka* of the 'Fauna Suecica;' *Skallesluger* of the Danes; *Skior-and* of the Icelanders; *Peksok* of the Greenlanders; *Seek* of the Cree Indians; *Hwyad ddanhedog* of the antient British; and *Goosander* and (provincial) *Jack saw* of the modern British. It is supposed to be the Κάστορος ὄρνις, of the Greeks, the *Fiber* and *Castor Ales* of the Latins, and is the *Bieure* of the old French.

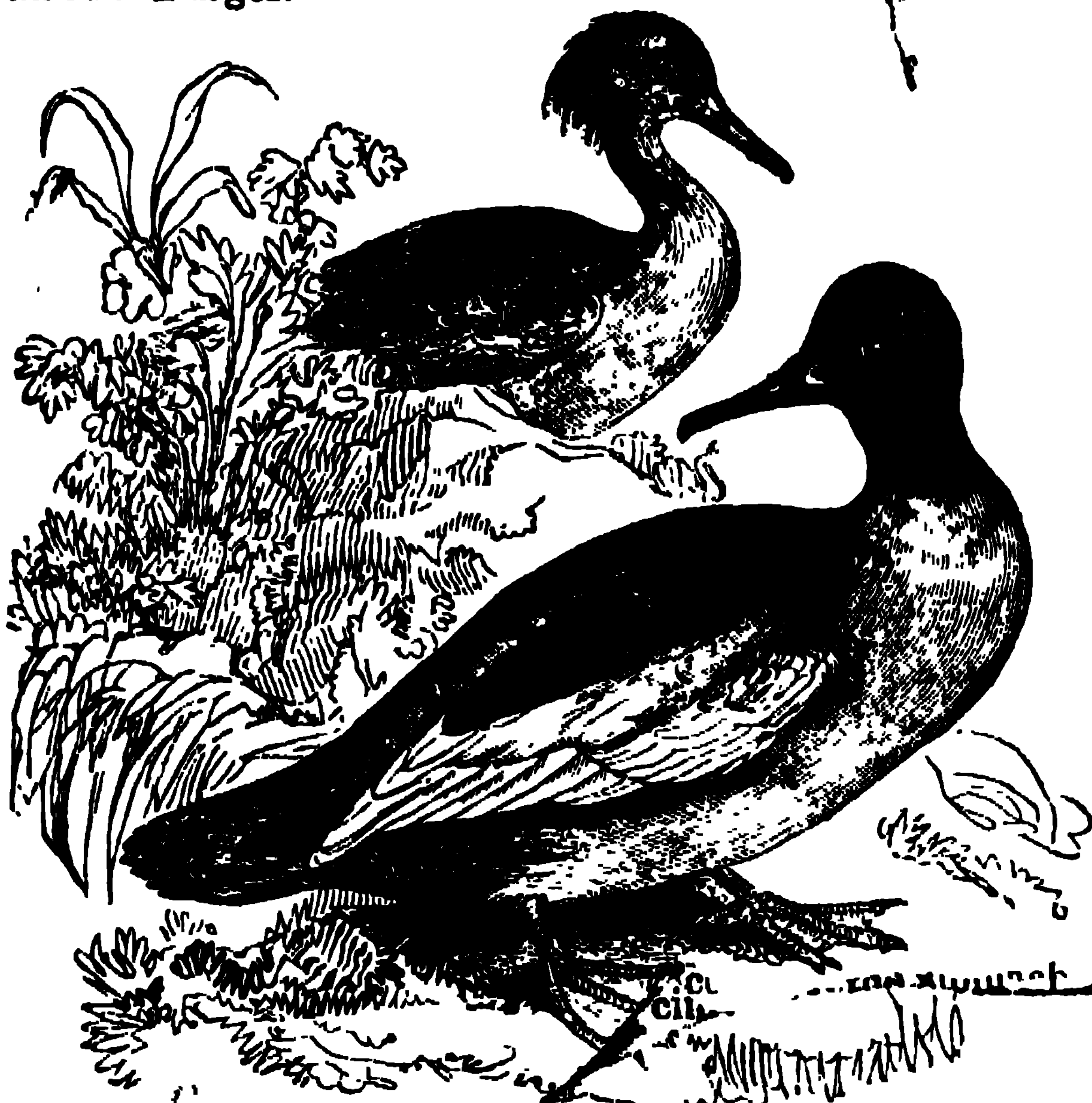
Food; Reproduction; Utility to Man.—The food of the Goosander consists of small fish, amphibious animals, small crustaceans and mollusks. Temminck says that its nest is placed among rolled pebbles on the banks of waters, in bushes or in hollow trees, and that it lays twelve or fourteen whitish eggs, which are nearly equally pointed at each end. The flesh is very rank and bad. Graves, who tasted one, pronounces it to have been offensive in the highest degree. The old French quatrain, in the *Portraits des Oyseaux*, gives the following description of its habits and of its quality as food:—

Le Bieure scait aux estangs se plonger
Pour le poisson, auquel est dommageable,
Mais qui vouldroit festoyer un diable,
Fauldroit un Bieure avoir pour son manger.

Geographical Distribution.—Mr. Gould (*Birds of Europe*) states that 'its native locality appears to be the northern regions of the continents of Europe and America, where, among large and unfrequented lakes, it finds an asylum and breeding-place; from these, its summer haunts, it emigrates southwards on the approach of the severities of winter, seldom appearing in our latitudes unless the season indicates an exceedingly low temperature in the Arctic circle: at such times it frequents our shores and unfrozen lakes, either in pairs or in small flocks of seven or eight: but the extensive inland waters of Holland and Germany appear to

* The under plumage of the specimen described by Dr. Richardson had the under plumage rich buff orange, which faded to white.

be its favourite resort.' This species was shot at Fulham in the severe winter of 1837. It appears in Dr. Richardson's list of birds, that they merely winter in Pennsylvania and migrate in summer to rear their young in the fur countries; the specimen described by him was killed on the Saskatchewan. It also occurs in Major Sabine's list of Greenland Birds. The Prince of Musignano notes it as rather rare in winter at Rome, and as not common, at the same season, in Philadelphia (*Specchio Comparativo*), and as occurring in Europe generally, and in America generally, in his *Geographical and Comparative List of the Birds of Europe and North America*. It was seen in Japan by Dr. Von Siebold and M. Bürger.



The Goosander (Mergus Merganser, Linn.). Lower figure, male; upper figure female.

Mergus.

Ex. ... 'rgus albellus.

Description.—*Old Male.* A great spot of greenish black on each side of the bill, a similar coloured but longitudinal one on the occiput; the tufted crest, neck, scapulars, small coverts of the wings, and all the lower parts very pure white; upper part of the back, the two crescents which are directed under the sides of the breast, and the edges of the scapulars, deep black; tail ash-coloured; sides and thighs varied with ash-coloured zig-zags; bill, legs (tarsi), and toes bluish-ash; webs black; iris brown. Length 15 to 16 inches.

In this state the bird is *Mergus albellus* of Linnæus and others; *Le petit Harle huppé ou la Piette* of Buffon; the *Weiser Säger* of Bechstein and others; the *Witte non Duiker* of Sepp.; the *Mergo Oca minore* of the 'Stor. degl. Ucc.,' and the Smew or White Nun of the English ornithologists.

Female.—Summit of the head, cheeks, and occiput reddish brown; throat, upper part of the neck, belly, and abdomen white; lower part of the neck, breast, sides, and rump bright ash; upper parts and tail deep ash; wings variegated with white, ash, and black. Length 15 inches.

Young of the year, similar to the female.

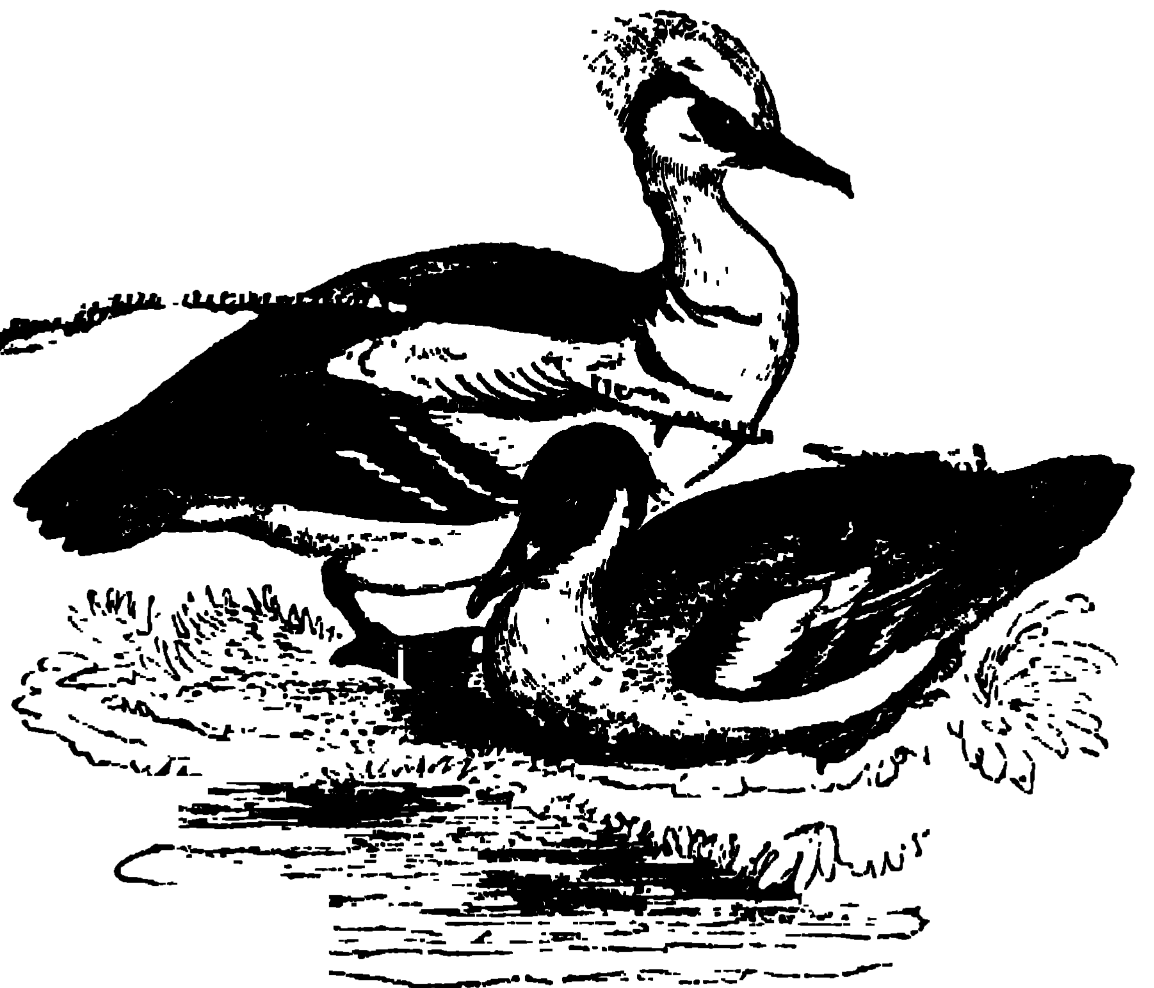
Males at the Age of One Year.—These are distinguished by the small blackish feathers which form the great spot at the side of the bill; by some whitish and white feathers scattered on the head; by the upper part of the back, which is variegated with black and ash-coloured feathers; and by indications of the two black crescents on the side of the breast. *The young of both sexes* have the great coverts of the wings terminated by a large white space, while the old ones have no white there except at the point.

The females and young of the year are the *Mergus minutus*, Linn.; *Mergus Asiaticus*, Gm.; *Mergus stellatus*, Brunn.; *Mergus Pannonicus*, Scop.; *La Piette femelle*, Buff.; *Le Harle etoilé* (young male), Buff.; *Mergo Oca minore* (female), and *Mergo Oca cenerino* (young male of the year), 'Stor. degl. Ucc.;' *De Kleine Zaagbek* (young of the year), Sepp.; and *Red-headed Smew* (young male in moult), Penn., 'Brit. Zool.'

This species is the *Kreutz-Ente* of Frisch and the Germans; the *Hviid Side* of the Danes; *Sugherone occhialino* of the Italians; *Lleian wen* of the antient British; Smew and (provincial) White Nun, Vare Widgeon and Smee of the modern British.

Food; Reproduction; Utility to Man.—The food of the Smew consists of small crustaceans, water-insects, mollusks, little fish, and water-plants. The nest, according to M. Temminck, is placed on the borders of rivers and lakes, and the number of eggs amounts to twelve; they are whitish. The bird is in no request for the table.

Geographical Distribution.—The countries of the Arctic circle in both worlds; migratory in autumn, but especially in winter, in England, Holland, France, and as far as Italy; rather abundant in Holland on the lakes and marshes (Temm.). It is seldom seen in Britain except in inclement winters. The species was not observed by Dr. Richardson, but it is noted by him in the tables compiled from the *Specchio Comparativo* as one of the birds that migrate northwards from or through Pennsylvania in spring, and may therefore be considered as returning to the fur countries to breed. The Prince of Musignano notices it as rather common in winter, particularly the young, near Rome, and as very rare and adventitious at Philadelphia (*Specchio Comparativo*). The same author, in his *Geographical and Comparative List*, notes it as occurring in Europe generally and on the northern and central coasts of America. Dr. Von Siebold and M. Bürger found it in Japan.



Mergus albellus: upper figure, male; lower figure, female. (Gould.)

M. Temminck remarks that the *Harles*, or birds of this subfamily, live upon the waters, where they swim, having generally the whole of the body submerged, and only the head out of the water.* They dive easily and often, swim with extreme agility *entre deux eaux*, and use their wings to assist them in this sort of natation. They remain long on wing, and fly very swiftly. Their walk is very vacillating and embarrassed, their legs or feet, as well as those of the sea-ducks, being more withdrawn within the abdomen than those of the ducks which have the posterior toe smooth. Their food consists principally of fish and amphibious animals, and of the first they make great destruction. In temperate climates they are only seen in winter; their habitual dwelling is in cold countries, where they breed. They are much wilder than the different species of ducks, and have not been domesticated. They moult once a year; but the old males, like those of the ducks, moult in the spring, whilst the old females and the young moult in the autumn. The young males, before their first or second moult, hardly differ at all from the females.

MERGER. It is somewhat difficult to give an exact definition of this legal term. In order to form an accurate notion of what is meant by it, the notion of the legal term estate [ESTATE] is a necessary preliminary. 'The accession of one estate to another, or more accurately speaking, the circumstance that two estates immediately expectant on each other, meet or are united in the same person, is the cause of the merger.' (Preston.) These words express in

* The Smew does not swim with the body submerged and only the head out of the water; but with a very fair portion of its body above the surface.

general terms the conditions necessary in order that merger may follow as a consequence. This consequence, called merger, is that the preceding estate ceases to exist, and the estate in which this preceding estate is said to be merged continues to be exactly the same as it was before that union which was the cause of merger.

It is necessary to add to this general description of the cause of merger, that the estate which is prior in point of time must not be greater (in legal estimation) that the estate which immediately follows: it may be either equal or less, but not greater. Also, the estates must both be vested estates, and both must be legal or both equitable estates.

Thus, if A is tenant for life, with reversion to B in fee, and A surrenders his estate to B, or B releases his estate to A, in either case the life-estate is merged, the consequence of which is that the estate in reversion immediately becomes a fee in possession. It seems that one term of years will merge in another, and a larger term in a less; at least this is the case when the second term is a term in reversion. Thus, if A is tenant for years, with reversion to B for years, and A surrenders or assigns his term to B, the term which belonged to A is merged. There is one exception to this rule: if the estate of A is derived from the estate of B as an underlease, the original term of B is not abridged by such merger. In fact, merger, in the proper sense of the term, can never apply to a surrender or assignment of an estate in land to the person by whom, and out of whose larger estate, that smaller estate was granted. But if A, who is seised in fee, leases first to B for five hundred years, and then to C for ten years, by way of immediate reversion, and C assigns his term to B, the estate of B is merged in that of C, which becomes an estate in possession, and can have no longer duration than ten years. Opinions vary as to the question whether a term can merge in a term in remainder.

Estates tail are not subject to merger; an exception which is a necessary consequence of the form of the gift to the heirs in tail, so long as there are any. Formerly, if an estate tail had become a base fee by the tenant in tail levying a fine, such base fee would merge by union with the immediate reversion in fee. But by a recent statute (3 and 4 Wm. IV., c. 74), such base fee will not merge in the reversion in fee, but shall be 'enlarged into as large an estate as the tenant in tail, with the consent of the protector, if any, might have created by any disposition under this act, if such remainder or reversion had vested in any other person.'

If the two estates, the union of which in one person might otherwise cause merger, do not unite in him in the same right, there is no merger.

The various exceptions to the general principles of merger are numerous enough to form the subject of an entire treatise. The whole subject is discussed at great length in the third volume of Mr. Preston's *Treatise on Conveyancing*.

The origin of the doctrine of merger is uncertain, and no hypothesis seems fully to explain all the cases of merger as now settled. In the case put by Bracton (fol. 12), the termor for years who had become the feoffee of the land, is considered as having, by the acceptance of the freehold, renounced the term (ex quo idem B se tenuit ad feoffamentum, tacite termino renuntiavit). The origin of merger is discussed in Preston's third volume, chap. iii., &c.

MERGUI. [TENASSERIM.]

ME'RGULUS. [AUK, vol. iii., p. 100.] The Prince of Musignano notes the *Little Auk* (*Mergulus Alle*) as occurring in the northern and central parts of Europe, and on the northern shores of America. (*Geographical and Comparative List.*)

MERGUS. [MERGANINÆ.]

MERIAN, MARIA SIBYLLA, the daughter of Matthew Merian, an eminent Dutch engraver, was born at Frankfort-on-the-Mayn, April 12, 1647. Her instructor in drawing was Abraham Mignon. In 1665 she married John Andriez Graff, a painter of Nürnberg, but the celebrity which attached to her own name as an artist prevented that of her husband from being adopted. They had two children, both daughters, who were also skilled in drawing. In consequence of liberal offers Madame Merian and her husband settled in Holland, but Maria Sibylla, whose great object was the study of nature, travelled for the sake of delineating insects, flowers, and other natural objects. In 1699 she went to Surinam for the express purpose of making the drawings which have since added so considerably to her fame, and remained there till the month of June, 1701.

She published—1, 'The Origin of Caterpillars, their Nourishment and Changes,' in Dutch, 2 vols. 4to., the first published at Nürnberg in 1679, the second in 1683, published in Amsterdam in Latin, 4to., 1717. This work, much enlarged by herself and her daughters, was published in French by John Marret, fol., Amst., 1730, under the title of 'Histoire Générale des Insectes de l'Europe.' 2, 'Dissertatio de Generatione et Metamorphosibus Insectorum Surinamensium,' fol., Amst., 1705, separately in Dutch and in Latin. These editions contain only sixty plates. To some of the later ones twelve plates were annexed by her daughters Jane Helen and Dorothea Maria Henrietta. There is an edition of this work in folio, French and Dutch, printed at Amsterdam in 1719; another in French and Latin, Hague, 1726; and another in Dutch in 1730. There have been also editions of the two works united, under the title of 'Histoire des Insectes de l'Europe et de l'Amerique,' fol., Par., 1768 and 1771.

Madame Merian died at Amsterdam, January 13, 1717. Many of the original drawings of this artist are preserved in the department of drawings and prints in the British Museum, in two volumes, purchased by Sir Hans Sloane at a large price. One contains the insects of Surinam, the other those of Europe. A few of the Surinam insects, though elegantly finished, appear, upon examination, not to be entirely drawings, but to have been coloured upon outline proofs of the engravings. Those of Europe are entirely original delineations. All are upon vellum. Other drawings of Madame Merian are preserved at Petersburg, in several collections in Holland, and at Frankfort. A portrait of Madame Merian, formerly Sir Hans Sloane's, is still preserved in the British Museum. An engraved portrait of her, by Houbraken, is prefixed to the Latin edition of the 'Origin of Caterpillars,' 1717.

(*Biog. Universelle*, vol. xxviii., pp. 366, 367; Brunet, *Manuel du Libraire*, 8vo., 1820, tom. ii., pp. 475, 476; Chalmers, *Biogr. Dict.*, vol. xxii., p. 72.)

ME'RIDA, a town of Extremadura, in Spain, in 38° 48′ N. lat. and 6° 15′ W. long. It was founded by Publius Casirius, a Roman general under the emperor Augustus, from whom it was named Emerita Augusta. It was subsequently made the capital of the province of Lusitania (which included nearly the whole of Portugal, with part of Leon, Extremadura, and Old Castile), and was the largest and most magnificent city in Roman Spain. From the hands of the Romans it passed into those of the Goths, who made it an archiepiscopal see. In the year 587 it was the focus of a plot formed by the Arians to kill the reigning monarch and extirpate the Catholic religion from the land. It was also the seat of several provincial councils, of which that of A.D. 666 is the most known. On the invasion of the Arabs in 711 it offered a stout resistance, but was eventually obliged to capitulate to Muza, who on entering the city was amazed at its vast size and the grandeur of its buildings. According to a Moslem chronicler it was then eight miles in circumference, and was garrisoned by 90,000 men. By the Arabs its original name was corrupted into Mérida. In 1230 it opened its gates to the Christian king Alonso XI. of Castille and Leon, after a great battle, in which, aided by the apostle James and other saints in white robes (as tradition has it), he routed a greatly superior force of Moors, headed by their king Ibn Hud. Alonso, to testify his gratitude, entrusted the government of the city to the military order of St. James, in whose hands it has till recently remained.

Modern Mérida is one of the most decayed and poverty-stricken towns in the Peninsula. In extent it has shrunk to a very small compass; its population has dwindled to less than 5000; and the trade in merino wool, of which it has long been the depôt, is rapidly declining. It is situated on the right bank of the Guadiana, on a rising ground, in the midst of an open and gently undulating country, naturally very fertile, but almost uncultivated, and in summer rendered very unhealthy by malaria. The sole interest of modern Mérida lies in its numerous remains of Roman magnificence. The houses, churches, walls, and pavements, abound in Roman fragments, columns, inscriptive tablets, altars, vases, statues, and bas-reliefs. In the fields, gardens,

and roads without the town, similar remains are found. But the principal ruins are an amphitheatre almost entire, which by letting in the waters of the Guadiana could at pleasure be turned into a naumachia; a circus, said to equal in size the Circus Maximus at Rome; a theatre, where in modern times bull-fights have been held; the shell of a lofty triumphal arch, now stripped of its ornaments; some baths in excellent preservation, and a gateway defaced by Arabic inscriptions. Encased in a private house is a small peripteral temple of Mars; the capitals as well as shafts of the columns are of granite. There are also two Roman bridges; one of enormous length and curious construction, with a fortress at one end. Near the town are the ruins of two grand aqueducts built of brick and granite mixed. Of the latter material are constructed all the antient edifices of Mérida, with very trifling exceptions.

At the distance from Mérida of one and two leagues respectively are two remarkable reservoirs, by some considered of Roman, by others of Moorish architecture. The first, called Albufera, is about 100 feet in length by nearly 60 feet in depth, enclosed by thick walls, with two fine towers. The other, called Albuera, is smaller, but its walls and the single tower which surmounts them are much finer.

(Mariana, *Historia General de España*; Conde, *Historia de los Arabes*; Ponz, *Viage de España*; Laborde, *Itinéraire Descriptif de l'Espagne*; Semple's *Journey through Spain and Italy*; Captain Cook's *Sketches in Spain*.)

MERIDIAN (*meridies*, mid-day). In the heavens the meridian is the circle which passes through the pole and the zenith of the spectator: on the earth it is the circle which passes through the pole and the spectator's position; consequently the terrestrial meridian is the section of the earth made by the plane of the celestial meridian.

The circle derives its name from being that on which the centre of the sun is found at mid-day, or real noon. In the case of a fixed star, the time at which its altitude is greatest is the moment of its coming on the meridian; but in that of the sun or a planet, the orbital motion prevents the moment of its culmination (or coming on the meridian) from being exactly that of its attaining its highest point; though the difference is not worth noting for ordinary purposes. [SPHERE, DOCTRINE OF THE.]

MERINO SHEEP. [SHEEP.]

MERIONES. [MURIDÆ.]

MERIONETHSHIRE, a county of North Wales, bounded on the north by Caernarvonshire and Denbighshire, on the north-east by Denbighshire, on the east and south-east by Montgomeryshire, on the south by Cardiganshire, and on the south-west and west by Cardigan Bay, an inlet of the Irish Sea. Its form approximates to that of a right angled triangle, having two sides facing the north and west respectively, and the hypotenuse facing the south-east.

The area of the county is estimated at 666 square miles; it is the sixth of the Welsh counties in respect of size, being a little smaller than Cardiganshire, but larger than Denbighshire. The population in 1821 was 34,382; in 1831 it was 35,315, showing an increase of 118 persons only, and giving 53 inhabitants to a square mile. In absolute population it is inferior to all the Welsh counties except Radnorshire; and in density of population is inferior even to that. Bala and Dolgelly are the assize towns: the county election for members of parliament takes place at Harlech. Bala, the nearest of these places to London, is in 52° 55′ N. lat. and 3° 34′ W. long., about 180 miles in a direct line north-west of London, or 194 miles by the Holyhead parliamentary road to Shrewsbury, and from thence through Llangynnog.

Coast Line.—The northern part of the coast is formed by the æstuary of which the Traeth Mawr and the Traeth Bach are portions. The Traeth Mawr (of which a considerable part has been recovered from the sea by an embankment about a mile in length, reaching across this branch of the æstuary from side to side) forms the boundary between Caernarvonshire and Merionethshire. The Traeth Bach or Bychan belongs entirely to the latter: it comprehends many thousand acres, and receives the rivers Fellnrhyd, or Bychan, and Dwyrhyd. This arm of the æstuary penetrates several miles inland, becoming narrow as it proceeds. It is dry at low water, except a narrow channel in the centre, through which the united streams find their way into the sea, and is crossed by a ferry.

From the Traeth Bach the coast runs south about six miles past Harlech to the little headland on which stands the village of Mochraes or Mochras. From the Traeth Bach to the town of Harlech the immediate neighbourhood of the sea is low and marshy. Between Harlech and Mochraes it rises into cliffs. It is skirted by sands dry at low water, and at some distance out to sea are three sand-banks, the 'Dutch Bank,' the 'Pontigal Bank,' and the 'Sarn Badrig' (St. Patrick's Causeway) or 'Sarn Badrhwyg' (Ship-breaking Causeway). This remarkable shoal runs from the immediate neighbourhood of the coast 22 miles out to sea in a south-west direction; it is composed of sand and gravel. It is dry at the ebb in spring tides, and in storms is marked by fearful breakers. Tradition says that this part of the sea was once inhabited land called Cantrér Gwaelod, or the Lowland hundred, and that it was overwhelmed by the sea about the close of the fifth century. (Pennant.) The name, St. Patrick's Causeway, is said to have originated from a monkish legend, that it was formed by St. Patrick in order that he might pass from Ireland to Britain.

From Mochraes the coast runs south-south-east eight miles to the river Maw, at the mouth of which stands the town of Aber-Maw, contracted into Ber-Maw or Barmouth. Throughout Merionethshire, north of the Maw, the coast is skirted by sands of greater of less breadth. From the Maw the coast runs southward 14 miles to the wide æstuary of the Dovey, taking a circuit convex to the sea, and rising into cliffs midway between the rivers. At the southern extremity of these cliffs the river Towy, or Disynwy, flows into the sea. Between the Towy and the Dovey the coast is again skirted by sands. The whole extent of the Merionethshire coast is about 38 miles, following its principal bends.

Surface and Geological Character.—Merionethshire is the most mountainous of all the Welsh counties, and contains some of the loftiest peaks in North Wales; there are however no peaks so high nor precipices so abrupt as those of Caernarvonshire. The principal mountain-chain is that which, in one part at least, is called the mountains of Berwyn, and which traverses the county from north-east to south-west, skirting the valleys of the Dee, the Wnion, and the Maw. The principal summits of this chain are, Cader Berwyn or Ferwyn, on the border of this county and Montgomeryshire, seven miles south of Corwen, 2563 feet above the level of the sea; Arran Fowddy, near the Wnion, above Dolgelly, 2955 feet; Pen-y-Gadair (summit of Cader Idris), three miles south-west of Dolgelly, 2914 feet; and Pengarn, at the extremity of the chain near the sea, 1510 feet. West of Bala, and near the centre of the county, is a group of mountains, of which Arrenig Mawr is the highest point, 2809 feet above the level of the sea. From this central group branches run westward to the sea in the neighbourhood of Harlech, and north-westward to join the group of Snowdon. There are no plains.

The county is almost entirely occupied with the slate rocks which predominate in North Wales. Along the valley of the Dee, as far up as Bala and the valley of the Alwen, a bluish-grey limestone is found, which is quarried for lime, the principal manure employed in the county. Great quantities of white limestone are quarried and burnt for lime near Corwen. This limestone is surrounded on every side by primitive argillaceous slate, which occupies all the eastern side of the county, as far as a line drawn from Bala, north-west along the vale of the Treweryn, and southward along the Twrch and the Dovey to Dinas-y-Mowddy. The slates of this formation are quarried in the neighbourhood of Corwen.

Westward of the line described the rocks are chiefly slaty, forming abrupt and rugged mountains of desolate appearance. Lead and copper mines are worked near Towyn at the mouth of the Disynwy, and copper-mines in the neighbourhood of Barmouth. Copper ore has been produced from the peat ashes of a turf pit near Dolgelly. Slates are quarried in the Berwyn mountains; and there are quarries producing slates of excellent quality at Festiniog near the Caernarvonshire border. The slates are shipped in the æstuary of the Traeth Bychan, near the place where they are raised.

It was the opinion of some former observers that Cader Idris and some other mountains presented traces of volcanic agency. 'The steeper part' of this mountain, says Mr. Pen-

nant, 'to the highest peak, or Pen-y-Gadair, grows more and more rocky; the approach to the summit extremely so, and covered with huge fragments of discoloured rocks, very rugged, and cemented by a semi-vitrified matter, which gives them a very volcanic look, added to their disjoined adventitious appearance. I met with, on my ascent, quantities of pumice of the same cellular kind with the toadstone of Derbyshire, but of a green colour. The day proved so wet and misty that I lost the enjoyment of the great view from the summit. I could only see that the spot I was on was a rude aggregate of strangely disordered masses. I could at intervals perceive a stupendous precipice on one side where the hill recedes inwards, forming a sort of theatre, with a lake at the bottom; yet very high in comparison of the base of the mountain. On the other side, at a nearer distance, I saw Craig Cay, a great rock, with a lake beneath, lodged in a deep hollow, possibly the crater of an antient volcano.'

Hydrography and Communications.—The principal rivers belonging to the county are the Dee, the Maw, and the Dovey, with their respective affluents.

The Dee rises in the valley skirted by the Berwyn mountains, very near the road leading from Bala to Dolgelly; from its source it flows north-east four miles (receiving by the way the Lew and the Twrch, each considerably longer than itself) into the lake of Bala, called Llyn Tegid, *i.e.* 'the fair lake,' by the Welsh, but by the English, Pimble Meer. [BALA.] From the lower end of the lake the Dee flows 12 miles in a winding course north-east to Corwen, receiving a number of mountain streams: from Corwen it flows five miles east to the border of the county, which it divides from Denbighshire for two or three miles farther, before finally quitting it. The Treweryn, or Glettwr, a feeder of the Dee, rises in the northern part of the county, and has a south-east course of about fourteen miles into the Dee, which it joins just below the lake of Bala. Just above Corwen the Dee receives the Alwen, one of its tributaries, which though belonging chiefly to Denbighshire, has five miles of its course upon and three miles within the border of this county.

The Maw, otherwise called Mawddach, rises near the centre of the county, and has a southern course of eight miles to its junction with the Lyniauduon, which lies more to the westward, and is of about equal length. From the junction of the Lyniauduon the Mawddach flows south-south-west, four miles to the junction of the Wnion (twelve miles long), which rises close to the source of the Dee, and flows along the same valley, but in an opposite direction. For the remainder of its course, which is about eight miles south-west, the Maw is a tide river. In this part of its course it expands into an æstuary in some places a mile wide, and in great part dry at low water.

The Dovey, or Dyfi, rises just within the border of the county, east of the mountain Arran Fowddy, in the Berwyn chain. From its source it flows south-west nearly thirty miles through a winding vale into the bay of Cardigan. It receives a number of small mountain streams, of which the Tafalog, the Afon, the Dulas, and the Cwmcelli are the principal. A part of the course of the Dovey itself and of the Tafalog, and the whole course of the Afon and the Dulas, belong to Montgomeryshire. The lower part of the course of the Dovey is on the border of Merionethshire, which it separates first from Montgomeryshire, and then from Cardiganshire. Near the mouth it expands into a wide æstuary, the greater part of which is dry at low water. The Dovey is not mentioned in Priestley's 'History of Navigable Rivers' as navigable, but is marked in the map which accompanies that work as navigable up to Machynlleth, or Machynleth, at the junction of the Cwmcelli and the Dulas, twelve or thirteen miles from the mouth of the river.

The Disynwy rises in the Berwyn mountains, a little to the north-east of Cader Idris, and flows south-west sixteen miles into the sea between the Maw and the Dovey. About three miles from its source it expands into a small lake, called Llyn-y-Myngil, which in width nearly fills the valley of Tal-y-Llyn, leaving only a narrow road on one side, and extends in length about a mile. The Disynwy above its mouth expands into an æstuary of about a mile wide, but just at the mouth is contracted into a very narrow channel.

None of these streams, except the Dovey, are navigable: the æstuary at the mouth of the Mowddy forms the harbour of Barmouth.

There are many lakes, most of them small. The largest are Llyn-Tegid, or Bala Lake, and Llyn-y-Myngil, already noticed.

The principal roads are those from London by Shrewsbury to Corwen and Bangor, to Bala and Caernarvon, and to Dolgelley, or Dolgelleu, and Barmouth, with branches to Towyn. The first of these enters the county on the east from Denbighshire, a little beyond Llangollen, and runs along the valley of the Dee to Corwen, from which place it follows the valley of the Alwen into Denbighshire. There are two Bala roads, both branching off from this to the left, one at Corwen, which follows the right bank of the Dee up the valley to Bala, the other a little beyond Corwen, which follows a valley parallel to that of the Dee, from which it is separated by intervening hills. The Caernarvon road runs up the valley of the Treweryn by Festiniog and Tan-y-Bwlch to Beddgelert, with a branch from Tan-y-Bwlch by the coast to Harlech and Barmouth. Another road from Bala follows the valley of the Dee and the Wnion to Dolgelley and Barmouth. There is a nearer road from London to Bala by Shrewsbury and Llangynnog.

The Dolgelley and Barmouth road runs from Shrewsbury, through Welshpool and Llanfair (Montgomeryshire), enters the county by the valley of the Tafalog, and follows that valley and the vale of the Dovey to Dinas-y-Mowddy, or Mowddw, from which place it runs west to Dolgelley and Barmouth. Two branches from this road run to Towyn; one a little before reaching Dinas-y-Mowddy, which follows the vale of the Dovey and then the coast; the other a little before reaching Dolgelley, which follows the vale of the Disynwy. This first branch to Towyn is partly in Montgomery and Cardigan shires, and communicates with Machynlleth and Aberystwith.

Divisions, Towns, &c.—This county, called by the Welsh Meironydd, or Meirionydd, is the only one in Wales that, with the addition merely of the word 'shire,' retains its antient designation. This name is supposed by some to be derived from Meirion, grandson of a chieftain to whom a large territory in this part of Wales was assigned in the fifth century. If however the district was known to the Romans, as some think, by the name Mervinia, which evidently contains the same root (Mervin, or Merum) as Meirion-ydd, the name must be of earlier origin.

Writers are not agreed as to the antient division of the county; but its limits appear to have undergone considerable change. One cantref, that of Ar[illegible]sth, south of the river Dovey or Dyfi, was by Henry VIII. added to Montgomeryshire, and the cwmwts or comots of Edernion and Glyndyfrdwy were detached from Powys-land, and added to this county.

The present divisions, with their relative situation and their population in 1831, are as follows:—

Ardwdwy, or Ardudwy,	N.W.	10,499
Edernion, or Edeyrnion,	N.E.	4,905
Estimaner, or Estumaner,	S.	4,631
Penllyn	N. & N.E.	6,654
Talybont, or Tal-y-bont, and Mowddy,	S. & S.E.	8,547
		35,236
Militia		79
		35,315

There are five antient market-towns, namely: Bala and Dolgelley, the assize-towns; Harlech, the place of county elections; Corwen and Dinas-y-Mowddy; and two, where markets have been established of late years, viz. Towyn and Barmouth. [BARMOUTH.]

Bala is in the parish of Llanykil or Llanycil, in the hundred of Penllyn, near the outlet by which the Dee quits the lake of Bala; 194 miles from London by Shrewsbury and Llangynnog, or 207 miles by Shrewsbury and Corwen. [BALA.]

The population of Llanykil parish was, in 1831, 2359: there was no separate return of the population of the town, but in 1821 it contained 1163 inhabitants out of 2467, the whole population of the parish at that time.

The living of Llanykil is a rectory, in the archdeaconry and diocese of St. Asaph: of the clear annual value of 250*l.*, with a glebe-house, in the gift of the bishop of St. Asaph.

There were in the whole parish, in 1833, two day-schools with 130 children; one of these, a grammar-school, with

75 boys, was partly supported by an endowment. There were seven Sunday-schools, with 1088 scholars.

Dolgelley, Dolgelleu, Dolgellau, or Dolgellen (from *dol*, dale, and *gelli*, *gellen*, or *celli*, a grove of hazels), is in the hundred of Talybont and Mowddy, on the south bank of the Wnion, a mile or two above its junction with the Maw, 208 miles from London by Shrewsbury, Welshpool, Llanfair, and Dinas-y-Mowddy. This town came into possession of Owain Glyndwr during his rebellion, and from here (A.D. 1400) he despatched ambassadors to France. It was the scene of a smart skirmish during the civil wars of Charles I., in which the parliamentarians were victorious. The town is in a delightful valley: the streets are narrow and irregularly laid out; and the houses are for the most part small, and ill built of limestone without mortar. Within the last few years however some handsome dwellings have been erected, and the general appearance of the town materially improved. The church is a neat structure, capable of accommodating a thousand persons, but destitute of any architectural pretensions. The county hall and county gaol were both erected in the present century; the former is a neat stone building, near the river Wnion. The town-hall is scarcely distinguishable from the ordinary houses, and the market-house is a low square edifice. There is a neat stone bridge of seven arches over the river Wnion.

The population of the parish (which is very extensive) was, in 1831, 4087; less than a fourth of which was agricultural. Dolgelley is the most populous and most commercial town in the county. The Population Returns give 72 males above twenty years of age as employed in the manufacture of 'webs,' or coarse woollen cloths and flannels. They are made in the houses and cottages of the weavers. Fulling-mills and bleaching-grounds have been established in the neighbourhood of the town; and the cloths, when finished, are bought up by agents, and sent to Liverpool for exportation to America, or to Shrewsbury, from whence they are sent to different parts of England. There is a good deal of business done in tanning and dressing lamb-skins and kid-skins, which are sent to Worcester and other places. The markets are on Tuesday and Saturday, and there are several yearly fairs. The summer assizes and the Easter and Michaelmas quarter-sessions are held at Dolgelley; also the petty-sessions for the division, and, commonly, the county court for the recovery of small debts.

The living is a rectory, in the archdeaconry of Merioneth and diocese of Bangor, of the clear yearly value of 440*l*. There are several dissenting places of worship in the town or parish, chiefly belonging to the Independents or the Calvinistic Methodists. There were, in 1833, five day-schools with 155 children: of these schools, one with 33 children was partly supported by an endowment; one day and Sunday national-school, with about 100 children, and some adults on Sunday; and fourteen Sunday-schools, with nearly 1400 scholars.

Harlech is in the parish of Llandandwg, in the hundred of Ardudwy, near the shore of Cardigan bay, 232½ miles from London by Dolgelley and Barmouth. It has been supposed that Harlech was a Roman post, but for this opinion there is no just ground. An antient British fortress, called originally Twr Bronwen, and, at an after-period, Caer Collwyn, occupied the site of the present castle erected by Edward I. This strong fortress was held in the civil war of the Roses by Dafydd ap Jevon ap Einion, a stout partisan of the house of Lancaster. Dafydd, after a valiant defence, was obliged to surrender to Sir Richard Herbert, on an engagement that his life should be spared. Edward IV. would have put him to death in violation of this engagement, had not Sir Richard declared that if the king persisted in his purpose, he would replace Dafydd in the castle, and the king might send whom he would to take him out. In the civil war of Charles I. the castle changed masters once or twice, but was finally taken by the parliamentarians under General Mytton, March, 1647. The town of Harlech is little more than a village of small size and insignificant appearance, situated between a wild and desolate mountain country and the sea. The most striking object is the castle, the ruins of which are situated on a lofty rock facing the bay, and rising above an extensive marsh once occupied by the sea. Its walls are tolerably perfect; they form a square of about seventy yards each way, with a round tower at each corner. From these corner towers formerly rose elegant turrets, but these are in great part destroyed. There are round towers on each side of the entrance. The apartments, now open to the sky, are of large dimensions. There are traces of the antient British fortress in the foundations of the present structure. Toward the sea, the castle was protected by the inaccessible precipice on which it stood; on the land side it was strengthened by a deep ditch cut with enormous labour in the solid rock. The assizes and county court, once held at Harlech, have been long removed; the market, held on Saturday, has fallen almost or quite into disuse; and the county election and the poll for the district are the only public business transacted here. There are several fairs, chiefly for live stock. The population of the parish, in 1831, was 658, about one-third agricultural.

The living of Llandandwg is a rectory, united with the chapelry of Llanbedr, in the archdeaconry of Merioneth and diocese of Bangor, of the clear yearly value of 194*l*.

There were, in 1835, one boarding-school, with six scholars; one day-school, partly supported by endowment, with 36 scholars; and two Sunday-schools, with 153 scholars.

Corwen is in the hundred of Edernion, on the south bank of the Dee, just below the junction of the Alwen, 194 miles from London on the Holyhead parliamentary road. There was antiently a British or Welsh post near this town, called Caer Drewyn; it consisted of a circular wall a mile and a half round, still remaining, on the summit of a steep hill, and of a circular habitation, now in ruins, within this enclosure. In the invasion of Wales by Henry II., A.D. 1165, the progress of that monarch was stopped by the assembling of the Welsh forces at Corwen under Owain Gwynedd. There are said to be some traces of the Welsh encampment near the town. Corwen is a small place, but neat; it stands on a rising ground just above the river. The church is a neat cruciform building, capable of accommodating about seven hundred persons, in a romantic situation, immediately at the foot of a rocky precipice belonging to the Berwyn mountains. On the south side of the church is a stone shaft or cross, called by the common people 'the sword of Glyndwr;' and on the same side of the churchyard is a neat almshouse for six widows of clergymen. There is another almshouse for eight poor women. One of the county bridewells is at Corwen. 'It is a small house, inhabited by the keeper (who is a shoemaker), his family, and the very few prisoners who are usually to be found here.'

The population of the parish, which is extensive, was, in 1831, 1980, about half agricultural. There are no manufactures. The markets are on Tuesday and Friday, the former for corn; and there are several yearly fairs.

The living is a vicarage, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 390*l*. There is also a sinecure rectory, of the clear yearly value of 373*l*.

There were, in 1833, one day-school, partly supported by endowment and subscription, with 60 children; one day and boarding-school, with 26 children; and twelve Sunday-schools, with 748 scholars. There are several dissenting congregations in the parish, chiefly Calvinistic Methodists.

Dinas-y-Mowddy, or Dinasmouthy, is in the parish of Mallwydd, and in the hundred of Tal-y-bont and Mowddy, 203 miles from London through Ludlow, Montgomery, Welshpool, and Llanfair. It has been thought by some to have been formerly a place of greater importance, but no marks of former greatness can be traced: it was perhaps the residence of some small chieftain. The town is situated on a shelf of rock at the junction of the Cerris, a small stream, with the Dovey: it consists of a few mean cottages, one story high, built of mud, and thatched with rushes. The population of the parish of Mallwydd in 1831 was 1137; but the part which is in the county of Merioneth, in which the town stands, was 998: the town itself perhaps contains 300 inhabitants. A good deal of flannel is made in the neighbourhood, partly in the weavers' cottages, and partly in factories. There is a corporation at Dinas-y-Mowddy: the mayor exercises a conjoint jurisdiction with the county magistrates in the lordship or borough, which comprehends the parish of Mallwydd and the greater part of that of Llan-y-Mowddy. There are stocks, and a crib or little prison, which are scarcely used; and the municipal institutions altogether are characterised as 'trifling and harmless.' (*Munic. Commiss. Report.*)

The living of Mallwydd is a rectory, of the clear yearly value of 255*l*., with a glebe-house, in the archdeaconry and

diocese of St. Asaph. The church is a large building, capable of accommodating a thousand people, but very thinly attended, most of the parishioners being dissenters. There were in the parish in 1833 one day-school, with 30 children, and nine Sunday-schools, with 539 scholars.

Towyn, or Tywyn, is in the hundred of Estimaner, near the coast, between the æstuaries of the Disynwy and Dovey, but much nearer to the former, 227 miles from London by Dinas-y-Mowddy and Machynlleth. The town consists of some good-looking houses, built chiefly of a coarse grey stone quarried in the neighbourhood. It is frequented in the bathing season by visitors attracted by the pleasantness of the situation in a quiet vale commanding a view of the sea and backed by lofty mountains. The church is a spacious building of considerable antiquity: it contains some venerable monuments; and in the churchyard are two rude pillars, one of them seven feet high, adorned with a cross, and bearing an inscription in antient but illegible characters. In a field near the church is a spring, called St. Cadvan's Well, the waters of which are considered beneficial in scrofulous, rheumatic, and cutaneous disorders. The spring is now enclosed, and two baths have been formed, with dressing-rooms attached.

The population of the parish in 1831 was 2694, about half agricultural. Some webs and flannels are manufactured. Races are held near the town, and are well attended. A customary market is held on Friday, and there is a yearly fair. The village and port of Aberdovey is in the parish: it is frequented as a bathing-place, having the recommendation of a firm hard sand: it is on the æstuary of the Dovey. There are dissenting chapels here. Slate-quarries are worked near Aberdovey, and a considerable share of the coasting trade is carried on at the port, which is a member of Aberystwith.

The living of Towyn is a vicarage, in the archdeaconry of Merioneth and the diocese of Bangor, of the clear yearly value of 224*l.*, with a glebe-house.

There were, in 1833, four day-schools (one of them partly supported by endowment), each with about 50 scholars; two boarding-schools, each with about 10 scholars; and eleven Sunday-schools, with 50 to 80 scholars each, chiefly connected with dissenters.

Divisions for Ecclesiastical and Legal purposes.—The county of Merioneth is partly in the diocese of St. Asaph and partly in that of Bangor, both in the ecclesiastical province of Canterbury. It is divided into five rural deaneries, which have the same name with the hundreds, and are nearly or quite conterminous with them. The deaneries of Ardudwy, Estimaner, and Tal-y-bont are in the archdeaconry of Merioneth and the diocese of Bangor; the deaneries of Mouthwy or Mowddy, Pontlyn or Penllyn, and Idernion or Edeyrnion, are in the archdeaconry and diocese of St. Asaph. The map subjoined to the Third Report of the Church Commissioners represents all that part of the county which is in the diocese of Bangor as forming the single deanery of Ardudwy. There are in all thirty-four parishes wholly or chiefly in this county, besides a portion of one parish (Beddgelert), which is chiefly in Caernarvonshire. Four of these parishes are for ecclesiastical purposes, united with others; but there are three sinecure rectories, so that the number of benefices is thirty-three: seventeen of these are in the diocese of Bangor, nine of them in the patronage of the diocesan, and sixteen in that of St. Asaph, of which fourteen are in the bishop's own gift. The benefices are, some of them, tolerably rich; the wealthiest is the rectory of Dolgelly, 440*l.* clear annual value; but most of them are under 200*l.* a year, and eight under 100*l.* a year.

The county is in the North Wales circuit: the Lent assizes and the Epiphany and Midsummer quarter sessions are held at Bala: the Midsummer assizes and the Easter and Michaelmas quarter-sessions, at Dolgelley. The county gaol is at Dolgelley; it is well situated, but badly arranged and deficient in many requisites. The number of prisoners is happily small. The committals to the county gaol, on the average of the years 1829 to 1835, were only about 28 annually. There are bridewells or houses of correction at Corwen, described above, and at Bala. The latter is a small building, part of the guildhall, insecure, out of repair, and slovenly. When visited by the inspectors of prisons (in 1836) there were no prisoners.

The court of election for the county, which returns one member to parliament, is held at Harlech: the polling-stations are Harlech, Bala, Dolgelley, Corwen, and Towyn. There are no parliamentary boroughs in the county.

History, Antiquities, &c.—In the earliest period of the authentic history of the island, Merionethshire was included in the territory of the Ordovices, who occupied nearly the whole of North Wales, a considerable part of Shropshire, and a part of Cheshire. [BRITANNIA.] In the Roman division of the island, it was included in the province of Britannia Secunda. It is said to have been called Mervinia by the Romans.

There are several traces of Roman works in this county. There are remains of camps near Bala [BALA]; and in the immediate neighbourhood of that town is Tommen-y-Bala, an artificial mound supposed to be a Roman work, and to have had a small fort on its summit.

Tommen-y-Mûr, 'the mount within the wall,' a station, of which the ditch and bank, with vestiges of a wall, remain, near Ffestiniog, is supposed to be the Heriri Mons of Richard of Cirencester, though Stukeley places it near Bala. Castell Prysor, a hilly fort about three miles east of Trawsfynydd, is considered by Pennant to have been originally Roman. The Dovey river is considered to be the Stucia (Στουκία) of Ptolemy. A Roman road from Maridunum, or Muridunum (Caermarthen) to Segontium (Caer Seiont, near Caernarvon) led through the county. It may be traced in the neighbourhood of Trawsfynydd through Tommen-y-Mûr, where it is called Sarn-Helen, a name which is interpreted by some 'the road or causeway of Helen,' the wife of the usurper Maximus, who assumed the purple (A.D. 381) in the time of the emperors Gratian and Theodosius; and by others, 'the road of the legion.' From this road, at or near Tommen-y-Mûr, roads are supposed to have led in one direction to Conovium (Caer Rhun, near Aber-Conway), and in another direction to Bala.

The Sarn-Helen is now entirely covered with turf, and is to be distinguished only by its elevation above the rest of the surface; but on digging, the layers of stone of which it was made are discoverable throughout the whole of its visible course: the aggregate breadth of these layers is about twenty-four feet. There are several tumuli or barrows near the road. There is a group of other monuments, probably sepulchral, near Rhyd-ar-Helen, a quarter of a mile from the Sarn-Helen, of considerable but undetermined antiquity. In the neighbourhood of Rhiw Goch, not far from Trawsfynydd, is a grave, called the Grave of Porus, covered with an inscribed stone, evidently Roman; and near it is a great upright monumental stone, of a kind frequent in Wales and in northern Europe. Roman coins, sepulchral urns, and other antiquities have been dug up in various places, particularly near Castell Prysor and Tommen-y-Mûr; at Caer Gai, near the south-west end of Llyn Tegid, or Bala Lake (probably the site of a Roman fort); and at Cefyn Caer, near Pennal, where was the site of another Roman fort.

There are a stone enclosure or fort and several other British antiquities near Llanddewi between Barmouth and Harlech; and in the same neighbourhood carnedds, cromlechs, and other Druidical remains. Other Druidical remains are found near Rhyd-ar-Halen, not far from Ffestiniog. They are called Beddau Gwyr Ardudwy, 'the graves of the men of Ardudwy.'

During the Saxon period and the reigns of the earlier English kings of the Norman dynasty, Merionethshire does not appear to have been the scene of events of historical interest. One battle took place between the Saxons and the Britons under the royal bard Llywarch Hên, between Corwen and Bala: the Briton lost the last of his sons in this battle, a bereavement which he has commemorated in one of his elegies. Merionethshire was afterwards the scene probably of many of those bloody feuds which disfigure the annals of Wales; but the remote and secluded situation of the county secured it from any serious foreign invasion. In proportion however as the consolidation of the Anglo-Norman power enabled the English to press the Welsh more closely, these previously unassailed fastnesses became the scene of contest. The invasion of Henry II., his advance to Corwen, and the stop put to his progress there by the Welsh under Owain Gwynedd (A.D. 1165), have been noticed. Henry retreated into England after sustaining a great loss in men and stores.

This county was probably conquered by Edward I., a little before the final conquest of Wales; as Harlech Castle was completed before 1283, in which year Hugh de Wlonkeslow was constable of it, Merionethshire was the scene of the

rebellion of Owain Glyndwr. [GLENDWR, OWEN.] Harlech Castle was one of his conquests.

In the war of the Roses, Harlech was held for the Lancasterians, but taken, as mentioned above, by Sir Richard Herbert. After the war was concluded, the county became and long continued to be the scene of great confusion. A multitude of outlaws and felons established themselves in the neighbourhood of Dinas-y-Mowddy, and perpetrated a variety of crimes, burning, robbing, and murdering in large bands, and driving cattle in open day with the greatest impunity. To quell these outrages, a commission was granted by Queen Mary to two gentlemen of the county; one of them Lewis Owen, vice-chamberlain and baron of the exchequer of North Wales. In pursuance of this commission, eighty of the band were seized and punished. To revenge this severity, Mr. Owen was waylaid and murdered when returning from the Montgomeryshire assizes (A.D. 1555), at a place now called, from the deed, Llydiart-y-Barwn, 'the baron's gate.' The vigorous measures to which this outrage gave rise led to the extirpation of the banditti, some of whom were executed, and the rest fled. The traditions of the country attest the terror which these ruffians excited. Travellers forsook the common road to Shrewsbury to avoid their haunts. In the civil war of Charles I., Harlech Castle was the object of contention. The repeated captures of this place, and a skirmish near Dolgelley, which had been garrisoned for the parliament, were the only incidents of the contest which occurred within the county.

The principal remains of the middle ages are Harlech Castle, already described, and the ruins of Cymmer Abbey, near Dolgelley, with two or three smaller castellated buildings. Cymmer Abbey appears to have been founded about A.D. 1198, by two Welsh chieftains, for Cistertian monks the yearly revenue at the dissolution was 58*l.* 15*s.* 4*d.* gross, or 51*l.* 13*s.* 4*d.* clear. Part of the church is still to be seen in a rich flat near the Maw, and shows the antient greatness of the structure. The east end has three narrow pointed windows, and three smaller ones over them: it is mantled with thick ivy. The great hall and the abbot's lodgings were used as a farm-house in Mr. Pennant's time.

Llys Bradwen, between Dolgelley and Towyn, is the ruin of a rude edifice, the house of an antient Welsh chieftain; and near Llanfihangel-y-Pennant are the remains of a castle supposed to be the castle of Bere, belonging to the last Llewelyn, prince of North Wales, and taken from him by William de Valence, earl of Pembroke, a short time previous to the final conquest of Wales.

Near the road from Bala to Dolgelley is Castell Corndochon, the ruin of a fortress of unascertained date.

(Pennant's, Evans's, and Bingley's *Tours in Wales; Beauties of England and Wales; Parliamentary Papers;* Greenough's *Geological Map of England and Wales;* Walker's do.; Arrowsmith's *Map of England and Wales,* &c.)

STATISTICS.

Population.—Merionethshire is almost entirely an agricultural county. Of 8879 males twenty years of age and upwards, 4959 are engaged in agricultural pursuits, and only 200 in manufacture or in making manufacturing machinery. These 200 are weavers of flannel and other woollens, distributed throughout the villages in small numbers, except that 70 of the men so employed reside at Dolgelley.

The following Table contains a Summary of the Population, &c., of every Hundred, as taken in 1831.

HUNDREDS, CITIES, OR BOROUGHS.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Ardudwy [illegible] .	1960	2159	18	77	1065	442	652	4,996	5,503	10,499	2535
Ed[illegible] „ .	1008	1036	5	23	583	257	196	2,433	2,472	4,905	1229
Estimaner „ .	852	951	9	43	465	218	268	2,304	2,327	4,631	1174
Penllyn . „ .	1392	1419	8	40	717	265	437	3,200	3,454	6,654	1656
Tal-y-Bont and Mowddyw . „ .	886	922	1	27	549	191	182	2,200	2,260	4,460	1108
Dolgelley (town) .	870	871	12	28	204	442	225	1,982	2,105	4,087	1177
Militia under training	—	—	—	—	—	—	—	79	—	79	—
Total . .	6968	7358	53	238	3583	1815	1960	17,194	18,121	35,315	8879

The population of Merionethshire, at each time the census was taken, was, in—

	Males.	Females.	Total.	Increase per cent.
1801	„	„	27,506	..
1811	„	„	30,924	12·42
1821	16,479	17,903	34,382	11·13
1831	17,194	18,121	35,609	3·56

showing an increase between the first and last periods of 8103, or about 29¾ per cent. on the whole population, being 17¼ per cent. below the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the three following periods of—

		£.		s.	d.	
1811	were	12,280,	being	7	11	for each inhabitant.
1821	..	14,559	„	8	5	„
1831	..	14,865	„	8	4	„

The sum expended for the same purpose for the year ending March, 1838, was 12,228*l.*; and assuming that the population had increased at the same rate of progression since 1831 as in the ten preceding years, the above sum gives an average of 6*s.* 8*d.* for each inhabitant. These averages are below those for the whole of England and Wales.

The sum raised in Merionethshire for poor-rate, county-rate, and other local purposes, in the year ending 25th March, 1833, was 18,405*l.* 11*s.*, and was levied upon the various descriptions of property as follows:—

	£	s.
On land . .	£17,436	5*s.*
Dwelling-houses .	793	10
Mills, factories, &c. .	99	7
Manorial profits, navigation, &c.	76	9
Total	18,405	11

The amount expended was—

	£	s.
For the relief of the poor . .	£15,247	0*s.*
In suits of law, removal of paupers, &c.	379	5
For other purposes . .	2,442	16
Total	18,069	1

In the returns made up for the subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 18,039*l.* 14*s.*, 17,188*l.* 4*s.*, 16,458*l.* 17*s.* (not given for 1837). and 15,794*l.* respectively; and the expenditure for each year was as follows:—

	1834.		1835.		1836.		1837.	1838.
	£.	s.	£.	s.	£.	s.	£	£
For the relief of the poor	14,977	4	14,216	7	13,974	4	13,440	12,228
In suits of law, removal of paupers, &c. .	707	7	841	13	276	4	528	90
Payments towards the county-rate . .	2,322	14	1,528	7	1,077	10	not given.	1,504
For all other purposes			800	0	883	2	926	829
Total money expended	£18,007	5	16,976	7	16,111	0	14,894	14,651

The saving effected on the whole sum expended in 1838, as compared with that expended in 1834, was therefore 3356*l.* 5*s.*, or about 18¼ per cent.; and the saving effected on the sum expended for the relief of the poor was rather more than eighteen per cent. in 1838 as compared with the expenditure in 1834.

The number of turnpike trusts in Merionethshire, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 6; the number of miles of road under their charge was 261. The annual income arising from tolls and parish compositions in lieu of statute duty was (in 1835) 4288*l.* 14*s.*, and the annual expenditure in the same year was as follows:—

	£.	s.	d.
Manual labour . .	1,098	12	0
Team labour and carriage of materials	139	10	0
Materials for surface repairs .	5	5	0
Tradesmen's bills . .	117	5	0
Salaries of treasurer, clerk, and surveyor	257	6	0
Law charges . . .	1	16	0
Interest of debt . . .	712	19	0
Improvements . . .	382	16	0
Debts paid off . . .	772	0	0
Incidental expenses . .	260	13	0
Estimated value of statute duty performed . . .	148	2	0
	3896	4	0

The county expenditure in 1834, exclusive of the relief for the poor, was 1659*l.* 13*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building and repairs, &c.	724	8	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	368	18	0
Shire-halls and courts of justice, building, repairing, &c. . .	30	0	0
Prosecutions . . .	174	6	0
Clerk of the peace . . .	163	10	0
Conveyance of prisoners before trial	33	17	0
Constables, high and special .	3	12	0
Coroner . . .	11	12	0
Miscellaneous	149	10	0
Total expenditure	1659	13	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 40, 25, and 63; making an average of 5 + annually in the first period, of 3 + in the second period, and of 9 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 2, 2, and 9 respectively. All these persons were charged with felonies.

The total number of committals in each of the same years was 2, 3, and 10 respectively; of whom

	1831.	1832.	1833.
The number convicted was	2	2	8
Acquitted .	—	—	1
Discharged by proclamation	—	—	1

At the assizes and sessions, in 1837, 5 persons were charged with crimes in Merionethshire; out of which number none had committed offences against the person, 1 was charged with offence against property committed with violence, and 4 for offences against property committed without violence. The first offender was acquitted, and the remaining 4 were convicted. Of those convicted, 1 was sentenced to be transported for seven years; 1 to be imprisoned two years, or above one year; and 2 for six months or under. Of the offenders, 2 were males and 3 females. Among the whole number, 3 could read and write only imperfectly, and 2 could neither read nor write.

The number of persons qualified to vote for the county members in Merionethshire, as registered in 1837, was 1336. Of these, 711 were freeholders, 103 leaseholders, 504 occupying tenants, 10 trustees, 7 mortgagees, and 1 annuitant: being one in 26 of the whole population, and one in 7 of the male population above twenty years of age, as taken at the census of 1831. The expenses of the last election of county members to parliament were, as usual, paid out of the general county-rate. There was not any contest at the last election for the county.

There is one savings' bank in this county; the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	18[illegible]	1833.	1834.	1835.	1836.	1837.
Number of Depositors	629	670	447	435	505	555
Amount of Deposits	£17,098	£16,727	£11,573	£10,693	£12,090	£11,162

The various sums placed in the savings' bank in 1835, 1836, and 1837, were distributed as under:—

	1835.		1836.		1837.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	251	£2,197	281	£2,493	234	£2,684
" 50	127	3,831	163	4,858	1[illegible]0	5,[illegible]01
" 100	43	2,752	51	3,[illegible]68	56	5,801
" 150	11	1,304	7	866	10	1,152
" 200	2	344	3	505	4	672
Above . 200	1	263	—	—	1	202
	435	10,689	505	12,090	555	11,162

Education.—The following summary is taken from the Returns on Education laid before parliament in the session of 1835:—

	Schools.	Scholars.	Total.
Daily schools . . .	50		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		663	
Females . .		359	
Sex not specified .		878	
			1,900
Sunday-schools . . .	172		
Number of children and others at such schools; ages from 4 to 80 years:—			
Males . .		3,462	
Females . .		3,224	
Sex not specified .		7,114	
			13,800

Assuming that the population had increased between 1831 and 1833 (the period when the educational inquiry was made) in the same ratio as in the ten preceding years, and that the number of children between the ages of 2 and 15 bore the same proportion to the whole population as it did in 1821, then we find 11,753 as the app[illegible] number of children living in Merionethshire in 18[illegible]. [illegible] Sunday-schools are returned from places where no other school exists, and the persons who attend them (615 in number) cannot be supposed to attend any other school. At all other places Sunday-school children have opportunity of resorting to other schools also; but in what number or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Four schools, containing 280 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is known to have been thus far created. In some of the Sunday-schools there are adults and aged persons as well as children. Making full allowance, even for these two causes, for inaccuracy, it may perhaps be fairly estimated that nearly all the children are receiving instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscription and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Daily Schools	17	445	3	249	26	1000	4	206
Sunday Schools	1	65	169	13,620	—	—	2	115
Total.....	18	510	172	13,869	26	1000	6	321

The schools established by Dissenters, included in the above statements, are—

		Scholars.
Daily schools . .	8, containing	246
Sunday-schools . .	161 .	13,143

The schools established since 1818 are—

		Scholars.
Daily schools .	23, containing	999
Sunday-schools . .	158 .	12,100

Four boarding-schools are included in the number of daily schools given above. No school in this county appears to be confined to members of the Established Church, or of any other religious denomination, such exclusion being

disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists.

MERLIN, the English name for the *Falco Æsalon* of Linnæus; *Emerillon, Rochier*, and *Faucon de Roche* of the French: *Stein Falke* of the Germans; *Smerlio, Smeriglio*, and *Falchetto* of the Italians; and *Corwalch* and *Llymysten* of the antient British.

Description.—Old Male.—Bill bluish-horn colour, palest at the base, darkest towards the tip; cere yellow, irides dark brown; top of the head blue-gray, with dark lines passing backward; the cheeks and thence round the back of the neck pale reddish brown, also marked with dark streaks, forming a collar; the whole of the back and wing-coverts fine blue-gray, the shaft of each feather forming a dark central line; wing primaries pitch black; upper surface of the tail-feathers bluish-gray over two-thirds of their length, with slight indications of three dark bands, the distal third nearly uniform black, the tips of all the feathers white; breast, belly, thighs, and under tail-coverts rufous, with brown central patches, and darker brown streaks; under surface of the tail-feathers barred with two shades of gray, a broad, dark, terminal band, and white tips; legs and toes yellow, claws black.

Female.—Top of the head, back, wing-coverts, and secondaries dark liver brown, the shaft of each feather darker, the edge tipped with red; the tail-feathers brown, with fine narrow transverse bars of wood-brown; under surface of the body pale brownish white, with darker brown longitudinal patches; bill, cere, eyes, legs, toes and claws, as in the male.

Young Males.—Resembling the females.

Birds of the Year.—The wings do not reach so far towards the end of the tail as those in the adult. (Yarrell, *Hist. of British Birds*.)

The length of this, the smallest of the British hawks, is from ten to twelve inches, according to sex.

Habits, Reproduction, &c.—'Assuredly,' saith the author of the Book of Falcourie, 'divers of these Merlyns become passing good hawkes and verie skilful; their property by nature is to kill thrushes, larks, and partridges. They flee with greater fierceness and more hotely than any other hawke of prey. They are of greater pleasure, and full of courage [illegible]n must make greater care, and take good heed to them, for they are such busie and unruely things with their beakes, as divers times they eate off their own feet and tallons very unnaturally, so as they die of it. And this is the reason and true cause, that seldom or never shall you see a mewed or entermewed Merlyn. For that in the Mew they do spoyle themselves, as I have before declared.' Sir John Sebright says that the Merlin will take blackbirds and thrushes, and that he may be made to *wait on*, that is, hover near till the bird be pursued and started again; 'and though a Merlin will kill a partridge, they are not strong enough to be effective in the field.' (*Observations on Hawking*.) The nest is placed on the ground, and but poorly made. The eggs (one inch seven lines long, and one inch three lines broad), vary in number from four to five, and are mottled with reddish-brown of two shades of colour.

Geographical Distribution.—Europe, as high as Denmark, and as low as the shores of the Mediterranean; Smyrna (Strickland), Cape of Good Hope (Smith), *quære tamen;* North America, according to Dr. Richardson, who says that 'a single pair were seen in the neighbourhood of Carlton House in May, 1827, and the female was shot. In the oviduct there were several full-sized white eggs, clouded at one end with a few bronze-coloured spots. Another specimen, probably also a female, was killed at Sault St. Marie, between Lakes Huron and Superior, but it could not be preserved.' Dr. Richardson was unable to ascertain the extent of its migrations on the American continent; neither Wilson, Nuttall, nor the Prince of Musignano notices it as occurring in the United States; but the latter (*Specchio Comparativo*) mentions it as very rare at Rome, and he only observed the young, and that in winter. It 'was formerly considered to be only a winter visitor to this country; but it is now very well ascertained that this species breeds on the moors of some northern countries. Mr. Selby has found the nest several times in Northumberland; and Dr. Heysham mentions three instances that came to his knowledge of Merlins' nests in Cumberland, where, he says, this bird remains all the year. Mr. Eyton tells me that it breeds on Cader Idris; and Mr. Dovaston sent a notice to his friend Mr. Bewick, "on the authority of the gamekeeper at Wynstay Park, North Wales, that he had often seen the nest of the Merlin, and that it built and bred there in the summer of 1826."

'In the more southern counties of Cornwall and Devonshire the Merlin is considered to be rare, and only seen in winter. On our eastern coast it is killed, but not very often, in Kent, Essex, and Norfolk. The specimens obtained are generally young birds, and these occur most frequently in autumn, or at the beginning of winter. In Ireland, according to Mr. Thompson, the Merlin is indigenous in several northern counties. It breeds also in Scotland, in Orkney, and in Shetland. In North Wales the young birds are called Stone Falcons; but among ornithologists the Stone Falcon is considered to be an adult bird. It is not however improbable that the habit of sitting on a bare stone or portion of rock, by which this species has acquired the name of Stone Falcon, is common to it at all ages and in other countries.' (Yarrell, *loc. cit.*)

The character of the Merlin is thus summed up in the old French quatrain:—

'L'Esmerillon beau par extremité
A le cœur gay, et fort hardy courage,
Et bien qu'il soit petit, si fait-il rage
A pour suyvir sa proye en gayeté.'



The Merlin.

Upper figure, young male of the year, which the female, unless very old resembles; lower figure, adult male.

MERLIN, or, more properly, MERDHIN. Some of the Welsh antiquaries speak of three Merlins: Merdhin Emrys, or Merlinus Ambrosius; Merdhin Wyllt, or Merlinus Caledonius, or Merlinus Sylvestris; and Merdhin ap Morvryn, otherwise called Merlinus Avalonius (from a poem ascribed to him, entitled 'Avallenau,' or the Orchard), and also known by the Latin names of Melchinus, Melkinus, and Mervynus. (Nicholson's *Eng. Hist. Library*.) It is generally agreed however that the second and third are the same person; and it is far from improbable that all the three Merlins are but one individual. Of Merlin Ambrosius the principal account we have is in Geoffrey of Monmouth's 'Historia Brittonum,' where he is represented as a great prophet and enchanter, who flourished in the time of King Vortigern, or about the middle of the fifth century. This is the Merlin who is celebrated by many of our old poets, especially by Spenser, in the 'Faery Queen,' book iii., and elsewhere; and he is also the subject of the English metrical romance of Merlin, of the first part of which there is a copy in the library of Lincoln's Inn, and a more antient one, containing also a second part, in the Auchinleck MS. in the Advocates' Library, and of which Mr. Ellis has given an analysis, with extracts, in the first volume of his 'Specimens of Early English Metrical Romances.

Of the Caledonian Merlin there is a life in Latin hexameters, extending to 1528 lines, by Geoffrey of Monmouth, who professes to have compiled it from an Armoric original; it is extant in one of the Cotton MSS. (Vesp., E. iv.), and has never been printed, but there is an account of it in the same volume of Mr. Ellis's work. (See also Pinkerton's *Inquiry into the Early History of Scotland*, ii. 275.) Fordun, in the third book of his 'Scotichronicon,' has a long account of Merlin the Wild, and especially of an interview between him and St. Kentigern, bishop of Glasgow, who lived in the latter part of the sixth century. This account agrees with other testimonies as to the age of the Caledonian Merlin, and also as to his having been a native and inhabitant, not of the country now called Wales, but of the Welsh kingdom of Reged, or Strathclwyd, which extended over the south-west of Scotland. That district, it may be added, still retains several traditionary recollections of the fame of Merlin; his grave, in particular, is yet shown near the village of Drumelzier, on the Tweed. (See Sir W. Scott's Introd. to Romance of *Sir Tristram*, p. 38; and Note to *Vision of Don Roderick*, p. 367, edits. of 1834.) Collections of the Prophecies of Merlin have appeared in French, at Paris, 1498; in English, at London, 1529 and 1533; in Latin, at Venice, 1554; and there are also manuscripts of them, in French and English, in the Cotton and other libraries. (See Warton, *Hist. of Eng. Poet.*, iii. 430, edit. of 1824.) We find some of them applied by the poet Laurence Minot, who wrote about 1360, to the victories of Edward III. (*Ibid.*, and Minot's *Poems*, by Ritson, *note*, pp. 100-104.) It appears to have been generally assumed by the French and English collectors that the author of these prophecies was Merlinus Ambrosius; but in the Scottish edition, printed at Edinburgh, 1615, they are attributed to Merlin the Wild, or the Caledonian. They appear to have been very famous in Scotland in the early part of the sixteenth century. (See Sir W. Scott's *Minstrelsy of the Border*, iv., pp. 134-147.) The 'Avallenau,' and some other Welsh poems, attributed to Merdhin Wyllt, are published in the 'Welsh Archaiology,' 3 vols. 8vo., 1801, &c. (See Mr. Sharon Turner's vindication of the authenticity of these productions, printed at the end of his *History of the Anglo-Saxons*, vol. iii., 1823.)

MERLON. [EPAULEMENT.]

MERLU'CIUS, a genus of fishes, belonging to the *Gadidæ*, or family of Codfishes, distinguished by the possession of only two dorsal fins and one anal fin, and the absence of barbule on the chin. This latter character distinguishes the species of the genus *Merlucius* from the Burbots (*Lota*) and Rocklings (*Motella*), and there being only two dorsal fins removes the present genus from the more typical Codfishes, where there are three dorsal fins.

The hake (*Merlucius vulgaris*, Cuv.) affords a familiar example of this genus. This fish is found on various parts of the coasts both of England and Ireland. It inhabits also the seas of the western coast of Norway, and is common on the northern shore of the Mediterranean. 'A hake of three feet eight inches long,' says Mr. Yarrell, in his 'History of British Fishes,' 'supplied the means of obtaining the following particulars. The length of the head, compared to the length of the body alone, as one to three, the depth of the body not so great as the length of the head; the ventral fins are placed in advance of the pectorals, the rays not unequally elongated; the pectoral fins commence in a line under the posterior angle of the operculum, the rays ending with the end of the first dorsal fin: the first dorsal fin itself short and triangular in shape; the second dorsal fin commences in a line over the vent; the anal fin begins immediately behind the vent; both the second dorsal fin and the anal fin terminate on the same plane, near the tail; the rays strong and stiff: the caudal rays about three inches long, and nearly even.

'The fin rays in number are:—Dorsal 10, 29; pectoral 11; ventral 7; anal 21; caudal 19.

'The head is depressed; the inside of the mouth and gill-covers black; the lower jaw the longest; teeth slender and sharp, in a single row in each jaw; the irides yellow, with a dark outer circle; the lateral line of the body straight throughout the posterior half, then gradually rising to the upper edge of the operculum; the appearance of the lateral line is that of one white line between two dark ones; the scales large; colour of the body dusky brown above, lighter beneath; dorsal and caudal fins dark; ventral and anal fins pale brown.'

The *Gadus Magellanicus* of Forster and the *G. Maraldi* of Risso are mentioned by Cuvier as species belonging to the present genus.

ME'ROE (Malacology), Schumacher's name for certain cowry-shells, *Cytheræa sulcata, scripta, hians*, &c.

ME'ROE. [NILE.]

MERO'PIDÆ, a family of Fissirostral birds which, in the opinion of Mr. Vigors, is most nearly connected with the conterminous tribe of *Tenuirostres* by the length, slenderness, and downward curvature of the bill. He adds that it exhibits at first sight a decided discrepancy with the succeeding family of *Hirundinidæ*, where the bill is short and wide; and that if we examine only the typical species of each, we must admit that in respect to these particulars there is a manifest distinction between them. Independently however of the general characters in which both families approach each other, such as the breadth of the *rictus* of the bill, the short and feeble legs, the strength of the wing, and the consequent habit of using that member chiefly in seeking their support, a gradual approximation is found to take place even in their bills; those of some of the extreme species of *Merops* becoming shorter as they approach *Hirundo;* while those of some of the latter group partially desert their own type, and by degrees assume the lengthened form of the bill of the *Bee-eaters*. The tail of *Merops* again is equally found to desert the typical characters of the group, namely, the greater length of the two middle feathers, in order to become even in some species, then slightly forked, and at length to be identified with the fully forked tail of *Hirundo*. Mr. Vigors is further of opinion that among the *Tenuirostres* the genus *Promerops* approaches nearest to the fissirostral group by means of *Merops*, the curved bill of which approaches the structure of its own. (Vigors, *On the Natural Affinities that connect the Orders and Families of Birds*. Linn. Trans., vol. xv.)

Mr. Swainson (*Classification of Birds*, vol. ii.) is of opinion that the *Meropidæ*, or Bee-eaters, succeed the Swallows, and says of the *Merops Apiaster* [BEE-EATER], that it annually visits Italy in flocks of twenty or thirty, and may be seen skimming over the vineyards and olive plantations with a flight much resembling the swallow, though more direct and less rapid. He observes that their bill is indeed considerably longer and more slender, but remarks that this difference is softened down by the intervention of the genus *Eurystomus*, containing the Swallow Rollers of India, Africa, and Australia, which have this organ very short. To these, he thinks, succeed the true Rollers, *Coracias* (Linn.), which arrive in Italy at the same time with the Bee-eaters, and associate also in small flocks. 'These two genera of Rollers,' continues Mr. Swainson, 'are so indissolubly united, that nothing but the strongest prejudice in favour of a preconceived theory could ever have induced certain naturalists (whose labours in other respects have been of much advantage to science) to have placed them in two different orders. The whole structure of the Rollers, their lengthened pointed wings, and their firm and often forked tail, at once induces the idea that they feed upon the wing; while their very short legs, scarcely longer than their hind toe, might have shown their incapacity to alight and walk, like the crows, upon the ground; but this question is at once decided by a knowledge of their economy, which, from personal observation, we have every reason to believe is much like that of the Bee-eaters. The intervention of the Rollers at once lessens the abrupt transition, which would otherwise be apparent, from the perfect-footed Swallows to the zygodactyle Bee-eaters; and we are thus prepared for all those birds whose toes, as it were, are soldered together like those of the *Meropidæ*. Here perhaps we may notice that most beautiful and rare genus *Nyctiornis*, or Night-feeder, as being in all probability that particular link by which nature connects this family with the Trogons, thereby uniting the three aberrant groups of the *Fissirostres* into one primary circle. M. Temminck, overlooking its particular structure, placed this genus with Merops, to which indeed it has a close resemblance; while its connection to *Prionites* (Ill.) in other parts of its organization is no less obvious. Its precise situation in short requires further investigation.' See also KINGFISHER and MELIPHAGIDÆ.

Mr. Swainson gives the following character as distinguishing the family:—

'Wings long, pointed; the first quill as long, or nearly so, as any of the others.

And he arranges the following genera under it:—

Merops. (Linn.)

Bill very long, slender, slightly curved, compressed; the culmen carinated; the tip entire, sharp, and not bent downward. *Wings* long, pointed; the tips of the lesser quills emarginate. *Tail lengthened. Feet* gressorial. (Sw.)

Example, *Merops apiaster.* [BEE-EATER.]

Nyctiornis. (Sw.)

Bill considerably curved, very long; the culmen with a parallel groove on each side. *Wings* rounded, convex. Plumage lax. Feet short, insessorial, resembling those of *Prionites*. (Sw.)

Example, *Nyctiornis amictus.*

Description.—Green; crown (in the adult) lilac; front of the throat and breast bright red. (Sw.) Total length about 13 inches, wings 5¼, tail (beyond) 3, tarsi hardly half an inch. (Sw.)

Locality, India.



Nyctiornis amictus. (Sw.)

Coracias. (Linn.)

Bill moderate, straight; the sides broad, but much compressed. The tip of the upper mandible bent over that of the lower, which is obliquely truncate. Nostrils basal, oblique, linear. Gape very wide, extending beneath the eye; the sides bristled. *Feet* insessorial, very short. All the toes cleft to their base; inner toe much the shortest. Wings moderate, pointed. (Sw.)



racias Abyssinica.

Example, *Coracias Abyssinica.*

Description.—White round the bill; body aquamarine green; back and wing-coverts cinnamon colour; shoulders, rump, and quills blue; tail green, the two middle feathers blue; two long loose processes terminating the two external quills.

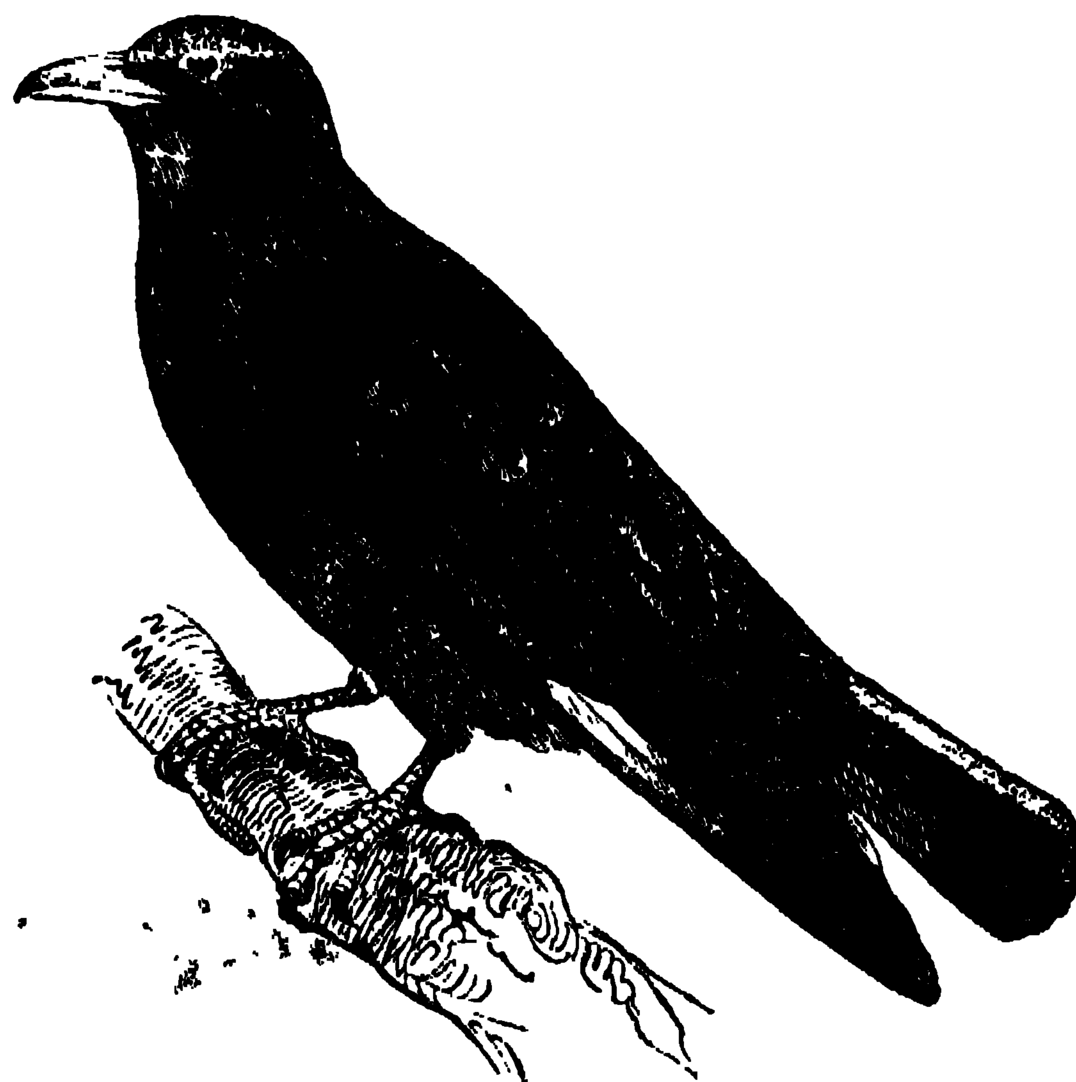
Subgenus, *Eurystomus,* Vieill.

Subgeneric Character.—Resembling Coracias, but the *bill* shorter and wider, and the wings longer. *Nostrils* very long. *Rictus* smooth. (Sw.)

Example, *Eurystomus Orientalis.*

Description.—Colour aquamarine green; throat and point of the wing (fouet de l'aile) azure; quills and tail-feathers black; a white stripe upon the wing.

Localities.—Java, the south of New Holland, and all the Polynesian Islands. It is the *Natay-kin* of the natives of the neighbourhood of Sydney, *Dollar-bird* of the colonists, and *Tiong ba tu* of the inhabitants of Sumatra,—*Coracias Orientalis,* Linn.



Eurystomus Orientalis.

Chloropygia. (Sw.)

General form between *Tamatia* and *Coracias. Bill* short; the tip not abruptly bent. Rictus bristled. *Nostrils* basal, linear, oblique. *Wings* short, convex, reaching only to the rump. The two first quills much graduated; the four next nearly equal and longest. Tail elongated, rounded, and broad. Feet as in *Coracias.* Madagascar. (Swainson.)

Example, *Chloropygia Leptosomus.* (Lesson; Ill., *Zool.,* pl. 22.)

Leptosomus. (Vieill.)

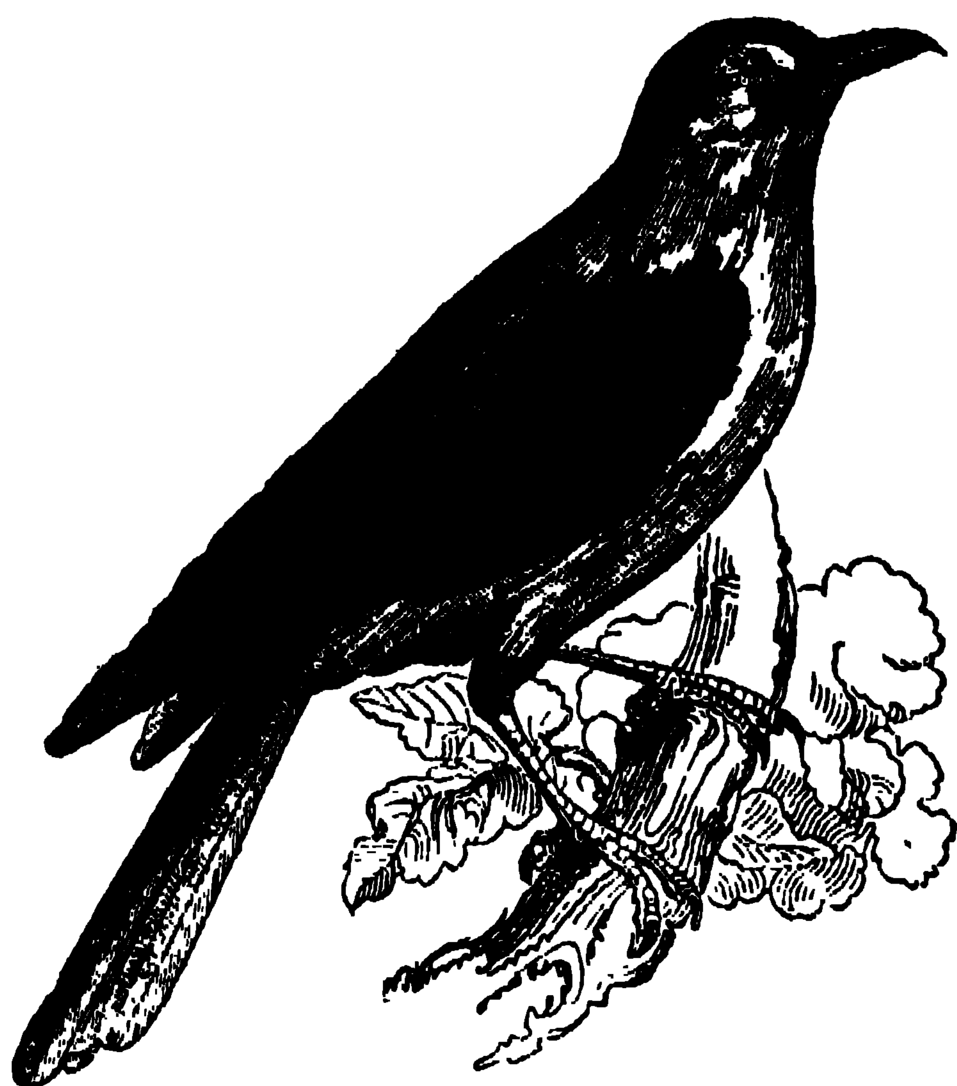
Bill about the length of the head, robust. The upper mandible curved and notched near the tip. Gonys straight. *Nostrils* oblong, oblique; the margins elevated, naked, and placed towards the middle of the upper mandible. *Feet* short. Toes in pairs, as in *Tamatia. Wings* lengthened, pointed; the first and second quills longest. Tail moderate, even. (Sw.)

Example, *Leptosomus viridis.*

Localities.—The country of the Kafirs and the coast of Zanzibar, where it is said to live in the forests on insects and fruits. The form is arranged by Lesson and others under the family *Cuculidæ.* [LEPTOSOMUS.]

Mr. Swainson makes the family of *Meropidæ* the first of the *Fissirostres.* It immediately succeeds the *Paradisiadæ* and precedes the *Halcyonidæ* in his arrangement.

M. Lesson, in his 'Table Méthodique,' gives the following genera as constituting the family of the *Meropidæ:—Merops, Alcedo, Dacelo, Ceyx, Syma, Todiramphus, Momotus,* and *Buceros.* See the articles KINGFISHERS and HORN BILLS.



Leptosomus viridis.

MEROPS. [BEE-EATER: MEROPIDÆ.]

MEROVINGIANS. [FRANCE.]

MERRICK, JAMES, an English divine and poet, born in 1720, died in 1769. At the age of fourteen, while still at Reading school, he published the 'Messiah, a Divine Essay,' and in 1739, at Trinity College, Oxford, he made a translation of the poem of Tryphiodorus on the Capture of Troy. He also published, in 1741, the Greek text of Tryphiodorus. He was chosen Fellow of Trinity College, Oxford, in 1744, and took holy orders, though, owing to infirm health, he never undertook parochial duties. His chief works were, 'A Dissertation on Proverbs, ch. IX.;' 'Prayers for a Time of Earthquakes and Violent Floods,' written in 1756, soon after the earthquake at Lisbon; 'An Encouragement to a Good Life, particularly addressed to some soldiers quartered at Reading.' He appears to have paid great attention to this class of men, who at that time especially required it. He also wrote 'Poems on Sacred Subjects,' and made an excellent translation of the Psalms into English verse. This, beyond all doubt the best poetical translation we have, was unfortunately not adapted for parochial choirs, inasmuch as it was divided into stanzas for music. On this account it has not been used as generally as its merits would justify. He published several other religious treatises, and some remarks on profane as well as sacred writers. Dr. Lowth calls him 'one of the best of men and most eminent of scholars.'

(Doddridge's *Letters;* Chalmers's *Biographical Dictionary.*)

MERSEBURG is one of the three governments into which the Prussian province of Saxony is divided. It is chiefly composed of territories which Saxony was compelled to cede by the treaty of Vienna in 1815, and includes the greater part of the former electoral circle or duchy of Saxony, a small portion of Thuringia, the bishoprics and chapter-lands of Magdeburg, Naumburg, and Zeitz, part of the duchy of Magdeburg, part of the districts of Leipzig and Meissen, with the counties of Mannsfeld and Stolberg, forming an area of 4000 square miles, with a population (1st of January, 1838) of 625,000. The eastern and larger part of the government is flat, with gentle eminences, but no mountains; the western and smaller portion is more mountainous than level, being partly occupied by branches of the Harz mountains and the Thüringerwald: this portion however contains extensive and fertile levels, and the whole of the government, though the soil is unequal, may be called fertile.

MERSEBURG, the chief town of the government, is situated on the river Saale, 15 miles from Leipzig, in 51° 22′ N. lat. and 12° E. long. It is an old irregularly built town, with narrow crooked streets, consisting of the town itself, the Close, and the two suburbs Altenburg and Neumarkt, the latter lying on the opposite bank of the Saale, over which there is a large stone bridge. The town is surrounded with walls, and has four gates. The most remarkable buildings are, 1, a fine palace, with a beautiful church, formerly the residence of the bishop, and afterwards of the dukes of Saxe-Merseburg, of the Albertine line: at present it is used for the government offices; 2, the cathedral, founded in the eleventh century, in which the dukes of Saxe-Merseburg were interred: it has a fine altar-piece by Lucas Cranach, and one of the largest organs in Germany; 3, the cathedral school; 4, the monastery of St. Peter, in the suburb of Altenburg; 5, the palace of Count Zechi; 6, the military hospital; 7, the new town-hall. Several of the schools are likewise handsome buildings. There are manufactories of various kinds, and extensive breweries and distilleries. The trade of the place is considerable, and with the advantages derived from its being the seat of the government, it is a very flourishing town.

(Müller, *Wörterbuch des Preussichen Staates*, 4 vols. 8vo., 1836.)

MERSENNE, MARIN, a very learned philosopher and mathematician, one of the religious order of *Minimes*, was born in 1588 at Oyse, in the present department of Maine, and received his education at the college of *La Flèche*, where he was a fellow-student of Descartes, with whom he formed an intimacy which a similarity of pursuits ripened into a friendship that death only dissolved. He afterwards studied at the university of Paris, and subsequently at the Sorbonne. In 1612 he took the vows at the convent of the *Minimes*, in the neighbourhood of Paris, and the year following received ordination as priest, when he deemed it incumbent on him to study the Hebrew language, a thorough knowledge of which he acquired. In 1615 he filled the chair of philosophy at Nevers, and there taught till the year 1619, when he was chosen superior of the convent, and on completing the term of his office he travelled into Germany, Italy, and the Netherlands. He finally settled in Paris, where his gentle temper and his polite and engaging manners procured him a number of distinguished friends. Of these the chief was the founder of the Cartesian philosophy, who entertained the highest opinion of his abilities, and consulted him upon all occasions.

It has been stated—though the story seems highly improbable—that Descartes, by the advice of Mersenne, at once changed his intention of founding his system on the principle of a vacuum, and adopted that of a plenum. The discovery of the cycloid has been ascribed to him and also to Descartes, but it now seems pretty clear that to neither are we indebted for the first notice of this curve. [CYCLOID.] Mersenne died at Paris in 1648, in consequence of drinking cold water when over-heated. The result of this indiscretion was an internal abscess in the side, which he desired should be opened. The surgeon made the incision two inches below the right place, and the patient expired under the operation.

The Père Mersenne was undoubtedly a man of great learning and unwearied research, and deserved the esteem in which he was held by the philosophers and literati of his age; but, except his *Harmonie Universelle*, his works are now unread and almost unknown. If by some he was overrated, by others he has been undervalued; and when Voltaire mentioned him as *le minime et très minime Père Mersenn* , he indulged his wit at the expense of one with whose writings, it is to be suspected, he was very little acquainted. His eulogist however, in the *Dictionnaire Historique*, admits that he very ingeniously converted the thoughts of others to his own use; and the Abbé Le Vayer calls him *le bon Larron*—a skilful pilferer. Nevertheless, the work above named, *L'Harmonie Universelle, contenant la Théorie et la Pratique de la Musique*, in 2 vols. fol., 1637, has proved of the utmost value to all later writers on the subject, and among the number, to the author of the present notice. Dr. Burney says of it, that notwithstanding all his 'partiality to his country, want of taste and method, there are in the work so many curious researches and ingenious philosophical experiments, which have been of the greatest use to subsequent writers, particularly Kircher, as render the book extremely valuable:' and Sir John Hawkins remarks, that 'the character of Mersennus as a philosopher and mathematician is well known in the learned world. To that disposition which led him to the most abstruse studies he joined a nice and judicious ear, and a passionate love of music: these gave a direction to his pursuits, and were productive of numberless experiments and calculations tending to demonstrate the principles of harmonics, and to prove that they are independent on habit or fashion, custom or caprice, and, in short, have their foundation in nature, and in the original frame and constitution of the universe.' The

work was, in 1648, translated into Latin and enlarged, by the author; but both the original and translation are now become as rare as they are curious to the antiquary and interesting to the musical inquirer.

MERSEY. [CHESHIRE; LANCASHIRE.]

MERTHYR TYDVIL, or TYDFIL, a parliamentary borough and parish in the hundred of Caerphilly and county of Glamorgan, 18 miles south by east from Cardiff and 140 miles west-north-west from London (direct distances). The parish extends from north to south about 10 miles, and has an average breadth of three miles; comprising the hamlets of Forest, Garth, Gellideg, Taff-and-Cynon, and Hoelch-Wormwood. Part of the hamlet of Forest and part of the hamlet of Taff-and-Cynon are not included within the limits of the parliamentary borough; with this exception, the borough is co-extensive with the parish. The town lies in a valley to the left of the Taff river, but the houses are so scattered that it is difficult to say where it either begins or terminates; indeed there is not in the whole parish what can be correctly denominated a street. The houses themselves are for the most part of a very mean description, consisting chiefly of the cottages of labourers, and beer and retail shops.

This place is said to take its name from Tydfil, or Tudfil, the daughter of the lord (regulus) of Garthmadrin, who was murdered here by a party of marauding Saxons. The church, subsequently erected near the spot, was dedicated to Merthyr Tydvil, or St. Tydvil the Martyr, in commemoration of the event. The present church is a neat edifice of recent erection. It is in the diocese of Llandaff, and the living, a rectory in the patronage of the marquis of Bute, has a net annual revenue of 675*l*. Besides the parish church there is a chapel-of-ease, called Dowlais Chapel. The assessed taxes of the parish, in the year 1830, amounted to 1587*l*. 13*s*. 1*d*.

Merthyr Tydvil was not represented in parliament till the passing of the 'Reform Act.' It now returns one member. The mining operations of this place were comparatively unimportant prior to the year 1755. About this time, experience having shown the importance of preparing iron by means of pit-coal, Mr. Anthony Bacon, member of parliament for Aylesbury, became the lessee of a considerable tract of land in the neighbourhood, and erected the first smelting-furnace at Cyfarthfa. During the American war that gentleman contracted with government for supplying the several arsenals with cannon, from which and other similar undertakings he ultimately realised a large fortune. At the close of the war the contract was transferred to the Carron works of Scotland, but in the mean time extensive works had been established at Pendarren and more particularly at Dowlais, in the hamlet of Hoelch-Wormwood. The latter place is now the seat of the immense smelting-furnaces of Messrs. Guest and Co., the largest in the empire. There are in all the parish twenty-four furnaces, and such has been their success, that in the year 1830 the quantity of iron produced in South Wales 'was estimated at 277,000 tons, while that made in Staffordshire and the rest of England did not materially exceed 300,000 tons.' (M'Culloch.)

The population of the parish, in 1831, was 22,083, but it is extremely fluctuating, a slight improvement or depression of the iron trade causing it to increase or decrease by thousands. A decrease of this description had taken place shortly before the taking of the last census, and it may therefore be presumed that the number above given is less than the average population. The market-days are Wednesday and Friday, and the fairs are held 13th May, 3rd September, 2nd December, and Trinity Monday.

(*Boundary, Population, and Church Revenue Reports; Beauties of England and Wales;* M'Culloch's *Statistical Account of the British Empire*, &c.)

MERTON COLLEGE, Oxford. This college was first founded at Maldon, in Surrey, in 1264, by Walter de Merton, bishop of Rochester and chancellor of England, who in 1274 removed it to Oxford.

Ela Longespé, countess of Warwick, is recorded to have been a benefactor to it about the year 1295. John Wylliott, D.D., chancellor of Exeter, gave exhibitions in 1380 for the maintenance of twelve portionists, called postmasters, who were afterwards increased to fourteen by John Chamber, fellow of Eton, who directed that his two additional exhibitioners should be elected from Eton College. Chalmers says, 'On the building of the chapel these postmasters officiated as choristers, and had a salary of six shillings and fourpence per annum for this service; but there was at that time no regular choir.' These exhibitioners, he adds, resided in a hall opposite to the college, which had been given to it by Peter de Abingdon, or Habendon, the first warden; and here they remained until the latter end of queen Elizabeth's reign, when they were taken into college. Henry Jackson, minor canon of St. Paul's, who died in 1727, and who had received his education at this college, founded four scholarships for natives of Oxford. His benefaction however, for whatever reason, did not pass into effect until the year 1753.

The foundation, at present, consists of a warden, twenty-four fellows, fourteen postmasters, four scholars, two chaplains, and two clerks. The natives of the following dioceses are not eligible to fellowships: viz. St. Asaph, Bangor, St. David's, Llandaff, Hereford, Chichester, Exeter, Rochester, Lichfield and Coventry, Chester, and Carlisle. In the election of a warden the fellows choose three of their number, whom they present to the visitor, the archbishop of Canterbury, who appoints one of them.

The preferment in the patronage of this college consists of the rectory of Gamlingay, in Cambridgeshire; the vicarage of Diddington, in Huntingdonshire; the vicarage of Eleham, in Kent; the rectories of Kibworth Beauchamp in Leicestershire, and Denton, in Norfolk; the vicarages of Embleton and Ponteland, in Northumberland; the rectories of Cuxham and Ibstone, in Oxfordshire; with the chapel of St. John the Baptist in Oxford, and the vicarage of St. Peter in the East, and the chapels of Wolvercot and Holywell: the rectory of Farley, and the vicarage of Maldon, with the chapel of Chessington, in Surrey; the rectory of Lapworth, and the vicarage of Great Wolford, in Warwickshire; and the vicarage of Stratton St. Margaret's, in Wilts.

Among the more eminent members of this society may be enumerated Duns Scotus; Bradwardine, and Islip, archbishops of Canterbury; Wicliffe, who was a fellow of Merton; George Owen, physician to Henry VIII.; Jewel, bishop of Salisbury; Sir Isaac Wake; Devereux, earl of Essex, the parliamentary general; Cressy, the Roman Catholic historian; Anthony à Wood, the Oxford historian; and Sir Richard Steele. Among the wardens, Dr. Chamber, another of Henry the Eighth's physicians; Sir Henry Savile; and Dr. Harvey, the discoverer of the circulation of the blood, have been the most conspicuous.

The buildings of this college consist of three courts; the outer one toward the street was rebuilt in 1589, except the tower and gate, which are of the fifteenth century. The most ancient part of the college was built by Sever and Fitzjames, two of the wardens, afterwards bishops. The chapel, at the west end of the outer court, is also a parish church, dedicated to St. John the Baptist. It contains, among other monuments, that of Sir Thomas Bodley.

The number of members of this college, December 31, 1838, was 135.

(Gutch's *Colleges and Halls of Oxford;* Chalmers's *History of the University of Oxford; Oxford University Calendar*, 1839.)

MERU'LIDÆ, *Thrushes*, a family of Dentirostral birds, placed by Mr. Vigors between the *Laniadæ*, or *Shrikes*, and the *Sylviadæ*, or *Warblers*. In the former family, he is of opinion that *Vanga*, Cuv., together with *Prionops*, *Laniarius*, and *Thamnophilus* of Vieillot, bring us in contact with the *Thrushes*, and that the extremes of the family will be found in *Graucalus* and *Ceblyperis* of Cuvier, which last has been latterly arranged with the *Thrushes*, and both of which, by their bills, in some degree depressed at the base, lead back to *Tyrannus*, and the other broad-billed groups which commence the family. Mr. Vigors feels inclined rather to leave *Ceblyperis* in its original station among the *Shrikes*, from the peculiarity of its tail-coverts, which form themselves into a kind of puffed-out cluster on the back.

'The family of *Merulidæ*,' continues Mr. Vigors, 'connected as above with the *Laniadæ*, comprises a considerable number of species and many natural genera; but which, like most of the *Insessorial* groups, have hitherto received but partial examination. The general views by which they seem to be allied among themselves, as far at least as can be judged from their present unorganised condition, may be stated as follows:—but with that expression of doubt which ever attends inquiries like the present, where the

absence of accurate information to the economy of the subjects before us, and of extensive knowledge of the forms connected with them, leaves us no better foundation for our inferences than partial conjecture. The genus *Myiothera*, Ill., seems to be the first group of the present family which is connected with the *Laniadæ*, where it is met by some of the smaller species of *Thamnophilus*. This group seems to lead by *Pitta*, Vieill., and perhaps *Cinclus*, Bechst., through some intervening forms, to the true *Thrushes*, or the genera *Turdus* of authors and *Merula* of Ray, which form the type of the family. To these we may add that portion of the Linnean Orioles, which, possessing the curved and notched bill of the *Thrushes*, constitutes the genus *Oriolus*, or true Oriole, of the present day. Here we meet several groups, generally arranged without order in the Linnean genus Turdus, and hitherto entirely uncharacterised, which gradually lead from the typical groups to those which possess a more generally delicate conformation; until the comparatively strong form and robust bill of the *Thrushes* is lost in the weaker body and more slender bill of the *Warblers*. Here again the group of *Rock Thrushes*, of which the *T. saxatilis* is the type, appear to bring us round, by their general habits and assimilating characters of bill and *tarsi*, to *Myiothera*, where we entered the family. Those birds which constitute the groups which we denominate *Chatterers*, and which form the genus *Ampelis* of Linnæus, are usually assigned a place near this family; and I must confess that, from the general affinity which they appear to bear to it, I have felt, and still feel, considerable doubt whether this be not their natural station. A strong affinity however on the other hand seems to unite them with the wide-gaped *Lipræ*, and some of those other groups which, by their bill, broad and depressed at the base, appear to come in contact with the earlier divisions of the present tribe, and the extreme of the *Fissirostres* which precede it. The general rule of placing groups in a conterminous situation, according to what appears to be the predominance of their more important characters, has inclined me to arrange the birds of which I speak, provisionally among the *Pipridæ*, at the extreme termination of the tribe before us. In my present view of the case, the characters in which they accord with that family and approximate the extreme groups of the preceding tribe appear to predominate. More accurate knowledge on these subjects will clear away these and similar difficulties. But I cannot too often insist upon the point, that whatever alterations may take place hereafter in our ideas respecting the disposition of these subordinate groups, they cannot interfere with the general principles which it is the object of this inquiry to illustrate. Instead of impugning our general views, they will merely remove those doubts on minor points in which our present limited acquaintance with nature involves us.'

In Mr. Swainson's 'Classification of Birds,' the reader will find elaborate details of his views respecting the affinities and analogies of this extensive family, which our limits do not permit us to give. The following is the arrangement in the Synopsis, where the family is placed between the *Laniadæ* and the *Sylviadæ*.

MERULIDÆ.

Subfamily *Brachypodinæ*.

Feet very short. Hind toe almost as long as tarsus. Claws short, much curved. Bill distinctly notched. Wings short, rounded. Feathers on the rump very long and thickset. (Sw.)

Genera. Micropus. (Sw.)

Bill as long as the head, straight, somewhat conic, but the culmen gradually arched. Tarsus remarkably short, feathered beyond the knees. Lateral toes unequal; hinder as long as the tarsus. Wings moderate, the first quill almost spurious. Tail even. (Sw.)

Example, *Micropus chalcocephalus*, 'Pl. Col.,' 453.

(Subgenus, *Hypsipetes* (Vig.). Tail forked. Example, *Hypsipetes psaroides* (Gould, 'Cent. Himala Birds').

Brachypus. (Sw.)

Bill shorter than the head; the base broad; the sides compressed; culmen elevated and curved from the base. Rictus generally furnished with bristles. Feet very short, strong; tarsal scales entire. Tarsus longer than the hind toe. Claws curved; broad, acute, wings and tail rounded. (Sw.)

Subgenera. *Brachypus* (Sw.). Bill short. Rictus bristled. Feet small, weak, lateral toes equal, hinder toe as long as the tarsus.

Example, *Brachypus dispar*, 'Pl. Col.,' 137.

Chloropsis (Jard. and Selb.). Bill more lengthened; the tip much hooked; the notch of the upper mandible forming a small distinct tooth. Rictus of gape smooth. Feet small, lateral toes unequal, the hinder toe rather shorter than the tarsus. (Sw.)

Example, *Chloropsis Malabaricus*, 'Pl. Col.,' 512, f. 2.

Jora, or *Iöra* (Horsf.). Bill nearly as long as the head, lengthened, somewhat conic, and rounded. Rictus smooth. Tarsus rather lengthened, the anterior scales divided. Middle and hinder toe of equal length. Tarsus much longer than either. Tail very short, fasciculated; the tips truncate and even.

Example, *Jora scapularis*, Horsf., 'Java.'

Andropadus (Sw.). Bill very short, resembling that of *Brachypus*, but the upper mandible crenated near the tip. Neck with setaceous hairs. Rictus bristled. Wings, tail, and feet as in *Brachypus*. (Sw.)

Example, *Andropadus vociferus*, 'Ois. d'Afr.,' 106, f. 2.

*Hæmatornis** (Sw.). Head crested. Bill short. Rictus bristled. Feet short, lateral toes unequal, hinder toe shorter than the tarsus, which is equal to the middle toe. Wings and tail rounded. (Sw.)

Example, *Hæmatornis chrysorrhoeus*, 'Ois. d'Afr.,' 111, pl. 107, f. 2.

Tricophorus. (Temm.)

Culmen gradually arched. Nostrils and base of the bill surrounded with lengthened slender hairs. Gape very strongly bristled. Margins of the mandibles white. Feathers of the crown and chin elongated. Nape of the neck with several conspicuous lengthened bristles, considerably exceeding the surrounding feathers. Feet short. Tarsus longer than the hind toe, and feathered beyond the knees. Inner toe shortest. Wings and tail moderate, the former with the three first quills much graduated.

Example, *Tricophorus olivaceus*. (Swainson, 'Birds of West Africa,' i., 264.)

Phyllastrephus. (Sw.)

Bill as long as the head, strong, the tip rather hooked. Rictus strongly bristled. Frontal feathers small, compact, directed forwards, and compressed on the base of the bill. Wings and tail moderate, rounded. Feet short, strong, robust. Tarsus and middle toe of the same length; lateral toes unequal, the inner shortest: hinder toe shorter than the inner one. Anterior tarsal scales divided. (Sw.)

Example, *Phyllastrephus Capensis*, 'Ois. d'Afr.,' 112, f. 1.

Icteria. (Vieill.)

Bill with the general form of that of *Brachypus*, but the culmen more elevated and arched, and both mandibles entire. Wings and tail rounded. Tarsus considerably lengthened and strong. Inner toe the shortest; middle toe very long. *Locality*, America.

Example, *Icteria polyglotta*. (Wilson, pl. 6, f. 2.)

Subfamily *Myotherinæ* (Myiotherinæ).—*Ant-Thrushes*.

Bill straight, somewhat cylindrical; the tip suddenly bent down or hooked.

Dasycephala. (Sw.)

Bill as long as the head, straight; tip abruptly hooked, base wide, the rest somewhat cylindrical. Gonys strong, ascending. Nostrils and front defended by stiff feathers and bristles, pointing in different directions. Rictus strongly bristled. Tarsus lengthened, slender: lateral scales numerous, small, oval. Toes and claws slender; inner toe shortest; outer toe connected to the middle as far as the first joint. Hind claw large. Wings and tail rounded.

Example, *Dasycephala rufescens*. (*Birds of Brazil*, pl. 76.)

Myiothera. (Ill.)

Feet lengthened, rather stout. Lateral scales of tarsus in an entire piece. Claws not broad, nor greatly curved. Bill as in the small *Thamnophili*. Wings short. Tail moderate, rounded.

Subgenera *Myiothera*. Inner toe longer than the outer and cleft to its base; outer toe with its first joint united to that of the middle toe. The tarsus with the anterior scales divided.

Dryinophila (Sw.). Inner toe shorter than the outer,

* N.B.—This name is preoccupied. [FALCONIDÆ, vol. x., p. 174.]

which is only slightly connected to the middle. Tarsus (typically) very smooth: all the scales entire. (Sw.)

Example, *Drymophila longipes*. ('Zool.,' Ill., ii. 23.)

Brachypteryx (Horsf.). See the article.

Myiocincla (Sw.). Legs strong. Inner toe longer than the outer. All the tarsal scales divided. Anterior claws small; hinder claw nearly straight, and as long as the toe. (Sw.)

Example, *Myiocincla Colma*, 'Enl.,' 821.

Pithys (Vieill.). Feet syndactile. The inner lateral toe shortest; the outer united by its first and second joint to the middle toe. All the tarsal scales entire.

Example, *Pithys albifrons*. Vieill., 'Gal.,' pl. 129.

N.B. Mr. Swainson remarks that *Urotomus, Formicivora*, and all the other small *Myiotheræ*, having the feet weak and the tarsal scales and claws similar to those of *Thamnophilus*, he thinks it better to refer them to that group; but as it has not been analyzed, he does not, in the *Classification of Birds*, incorporate those two subgenera, although proposed by himself some years ago. See *Zoological Journal*, vol. i., p. 301; and the paper *On the Natural Affinities that connect the Orders and Families of Birds*, by Mr. Vigors, who refers to Mr. Swainson's memoir in the 'Zoological Journal,' and observes that the reader may there see the line of connexion between *Thamnophilus* and *Myiothera* fully established by the intervention of several forms gradually passing into each other, such as *Formicivora, Urotomus*, and *Drymophila*. (*Linn. Trans.*, vol. xv.)

Pitta. (Temm.)

Bill strong, thrush-like: the culmen gradually curved. Nostrils nearly naked. Wings moderate; the first and second quills but slightly graduated. Tail remarkably short, almost hid by the covers. Feet very long, pale, the scales nearly entire. Inner toe slightly shorter than the outer. India and Australia. (Sw.)

Example, *Pitta gigas*. 'Pl. Col.,' 217.

Subgenera *Chlorisoma* (Sw.). Bill as in *Pitta*, but somewhat thicker. Nostrils protected and nearly covered by incumbent feathers. Rictus bristled. Wings rounded; the four first quills much graduated. Tail moderate or lengthened, graduated. Feet strong, rather lengthened: the inner toe scarcely shorter than the outer.—India. (Sw.)

Example, *Chlorisoma thalassina*. 'Pl. Col.,' 401.

Grallaria (Vieill.). Bill thrush-like, as in Pitta. Wings rounded; the two first quills graduated, the first half as long as the second, the three next nearly equal. Tail short and rounded. Legs very long: the tarsus slender, pale; the anterior scales divided, the lateral scales (typically) entire. Lateral toes nearly equal.

Example, *Grallaria Rex*. 'Enl.' 702.

Mr. Swainson remarks that it appears to him that *Chamæza*, Vig., is more an aberrant species of *Grallaria* than a distinct type in the genus Pitta: the only species known chiefly differing in having the tail longer and the lateral scales divided.

Cinclus. (Bechst.)

Bill moderate, rather slender, very straight, considerably depressed; tip absolutely notched; gonys ascending. Nostrils naked, membranaceous; the aperture very small and linear. Wings moderate, rounded; the first quill spurious. Tail very short, even. Feet large, very strong, pale; the lateral toes equal; tarsal scales entire and smooth. (Sw.)

Example, *Cinclus albicollis*. Selby, pl. 45.

Subfamily *Merulinæ*. *True Thrushes*.

Wings more lengthened and pointed. Bill notched, with the culmen gradually curved to the tip, which is bent, but not hooked, over the lower mandible. Feet formed both for perching and walking. (Sw.)

Petrocincla. (Vig.) Rock Thrushes.

Bill thrush-like: tip of the upper mandible abruptly bent down and nearly entire. Wings moderate; the first quill spurious; the second shorter than the three next, which are equal and longest. Tail even. Anterior scales divided. Lateral toes equal. Claws small, but slightly curved.

Example, *Petrocincla montana*. 'Ois. d'Afr.,' pl. 101.

Subgenus *Petrophila* (Sw.). Bill thrush-like: the culmen and tip of the upper mandible gradually bent and entire. Wings and tail as in the last. Legs pale; anterior scales entire. Lateral toes unequal; inner shortest. Claws moderate and fully curved. (Sw.)

Example, *Petrocincla cyanocephala*. (Gould, 'Cent. of Himal. Birds.')

Merula. (Willughby.)

See the article BLACKBIRD.

Orpheus. (Sw.)

General structure of *Merula*. Bill more curved in the culmen; the notch small, or nearly obsolete. Rictal bristles rather strong. Wings rounded; the three first quills graduated. Tail lengthened, graduated, or rounded. Inner toe manifestly shorter than the outer.

Example, *Orpheus Polyglottus*. Wilson, pl. 10, f. 1.

Subgenus *Cossypha*, Vig. General structure of *Orpheus*, but the wings more rounded, and the tail less so. Rictus smooth. Africa only.

Example, *Cossypha leucoceps*. (Sw., 'Birds of West Africa,' 1, pl. 32.)

Chætops. (Sw.)

Bill moderate, thrush-like, notched. Nostrils basal, large, naked, membranaceous; the aperture lateral and linear. Frontal feathers rigid; the shafts composed of bristles. Chin feathers the same, but weaker. Rictus bristled. Wings very short and rounded. Tail rather lengthened, broad, convex, soft, and slightly rounded. Tarsi very long and strong: anterior scales divided. Lateral toes unequal. Claws small, obtuse, and slightly curved; the three anterior of equal size.—Africa. (Sw.)

Example, *Chætops Burchellii*, Pl. 'Col.,' 385.

Subfamily *Crateropodinæ*. *Babblers*.

Legs remarkably long and strong, with the claws but slightly curved. Wings short and rounded. Tail large, broad, graduated, and very soft. Plumage lax. Bill compressed, straight, hard; the tip nearly entire. (Sw.)

Pellorneum. (Sw.)

Bill moderate, straight, somewhat conic; tip notched; gonys ascending. Frontal feathers small, rigid, directed forwards. Rictus bristled. Wings very short, much rounded. Tail moderate, graduated. Tarsus and middle toe of equal length; lateral toes much shorter, and equal; hinder toe shorter than the tarsus. Anterior claws very small, and but slightly curved. Tarsal scales hardly divided. (Sw.)

Example, *Pellorneum ruficeps*.

Crateropus. (Sw.)—(Ianthocincla—part.)

Bill nearly as long as the head; more or less straight from the base; much compressed; obsoletely notched. Rictus bristled. Frontal feathers rigid. Wings short, rounded. Tail large, broad, soft, and rounded. Feet very large and strong. Tarsus lengthened; the anterior scales divided. Lateral toes nearly equal; hind toe large, nearly as long as the middle toe. Plumage lax, soft. (Sw.)

Example, *Crateropus Reinwardii*. ('Zool.,' Ill., i. 30.)

Grallina. (Vieill.)

Bill slender, straight, rather cylindrical above; the sides very little compressed; base broader than high; tips of both mandibles distinctly notched. Nostrils naked, basal. Rictus with a few bristles. Wings very long; first and second quills graduated, four next longest. Tail lengthened, even. Feet strong, formed for walking, black; anterior toes divided, the rest entire. Lateral toes equal; middle toe and claw short, very little longer than the hind-toe.—Australia.

Example, *Grallina melanoleuca*. Vieill., 'Gal.,' pl. 150.

Subgenus *Cinclosoma* (Horsf. and Vig.). Bill very straight; culmen and gonys equally curved towards the point, which is slightly notched. Wings very short; the two first quills graduated; the three next longest, and of equal length. Tail lengthened, broad, graduated; the feathers narrowed towards their tips. Under-tail coverts very long. Feet moderate; inner toe longer than outer. Australia. Analagous to *Accentor* among the *Sylviadæ*. (Sw.)

Example, *Cinclosoma punctata*. (Shaw, 'Zool. of N. H.,' pl. 9.)

Malacocircus. (Sw.)

Bill more or less curved, by being elevated at the base, having the sides much compressed, and the culmen high and arched; the tip almost entire, and not suddenly bent over the lower. Feet very large. Tail soft, graduated, generally lengthened. (Sw.)

Example, *Malacocircus striatus*. ('Zool.,' Ill., ii., pl. 127.)

Subgenera. *Megalurus* (Horsf.). Bill slender. Rictus

bristled. Wings very short; the two first quills graduated, the four next all of the same length, and longest. Tail lengthened, graduated; the feathers narrow. Feet very large and strong. Toes lengthened; the inner toe rather longer than the outer. Claws slender, and but slightly curved. Anterior scales divided, lateral, entire.

Example, *Megalurus palustris.*

Pomatorhinus (Horsf.). General structure of *Crateropus;* but both mandibles of the bill curved and entire, and the wings shorter and much more rounded; four first quills graduated. Tarsal scales entire. Inner toe rather shorter than the outer.

Example, *Pomatorhinus montanus.*

Timalia (Horsf.). Plumage lax. Bill straight, rather short, much compressed; culmen high and arched gradually; tip obsoletely notched or entire; commissure curved. Wings short, rounded. Tail more or less lengthened, graduated. Feet strong. Lateral toes nearly equal.—India, Australia, Africa. (Sw.)

Example, *Timalia thoracica.* ('Pl. Col.,' 76.)

Pteroptochus. (Kittlitz.)

Feet of extraordinary size and thickness; all the anterior toes nearly equally long; claws long, slender, slightly curved. Tail consisting of fourteen feathers, rounded and carried erect. Wings very short. Representing *Menura* and *Orthonyx.*—Western Tropical America only. (Sw.)

Example, *Pteroptochus megapodius* (Kittl., pl. 4. 'Zool.,' Ill., ii., pl. 117.)

Subfamily *Oriolinæ.* Orioles.

Bill thrush-like, as long as the head, broad at the base, compressed beyond; the base and gape devoid of bristles. Nostrils naked; aperture large. Wings lengthened. Rump feathers thick. Lateral toes unequal. (Sw.)

Donacobius. (Sw.)

Habit and general structure of *Crateropus.* Bill lengthened, slender; the culmen arched from the base; the tip hooked and notched. Nostrils large, naked, membranaceous; the aperture large, oval, terminal. Wings remarkably short, and rounded. Tail moderate, broad, cuneated. Feet very large and strong. Lateral toes equal; claws slender, acute, slightly curved.—America only. (Sw.)

Example, *Donacobius vociferans.* ('Zool.,' Ill., ii., pl. 72.)

Sericulus. (Sw.)

Bill rather stout, resembling that of *Oriolus.* Nostrils naked. Wings moderate; two first quills equally graduated; third nearly as long as the fourth. Tail moderate, even. Feet strong, robust. Tarsus much longer than hind toe; inner shortest.—Australia. (Sw.)

Example, *Sericulus chrysocephalus.* (Lewin's 'Birds of New South Wales,' pl. 1.)

Oriolus. (Linn.)

Bill as long as the head; broad at the base; tip distinctly notched, and somewhat hooked. Nostrils short, nearly naked; aperture lateral, large, and oval. Wings rather lengthened; first quill very short; second not quite so long as the third, which is generally the longest. Tarsus rather short, longer than the hind toe and claw; anterior scales divided.—Old World. (Sw.)

Example, *Oriolus Galbula.* ('Enl.,' 26.)

Subgenus *Irena* (Horsf.). Bill of Oriolus; but the culmen much raised and considerably arched from the base, rather hooked at the tip. Nostrils partly defended by short plumes, which cover the membrane. Rictus slightly bristled. Wings and tail as in *Sericulus.* Feet small. Tarsus very short, scarcely longer than the hind toe and claw: anterior and lateral scales entire. Inner toe rather shortest. Rump feathers very thick, and slightly spinous.—India.

Example, *Irena Puella.* (Horsf., 'Java.' 'Pl. Col.,' 70.)

Dulus. (Vieill.)

Bill very short, much compressed, but with the culmen elevated and arched. Commissure curved. Nostrils as in *Oriolus.* Wings rather short; first quill not half so long as the second; third, fourth, and fifth longest; secondaries with the tips notched; tertials lengthened. Tail moderate, slightly forked. Feet as in *Oriolus.* Claws strong, broad, much curved.—South America.

Example, *Dulus palmarum.* ('Enl.,' 156, f. 2.)

Sphecotheres. (Vieill.)

Bill rather short, strong, partaking of the structure both of *Dulus* and *Oriolus;* the base broad; commissure straight, gape very wide, extending beyond the eye. Nostrils naked, the aperture large and oval. Wings, tail, and feet as in *Dulus.* Tarsus hardly longer than the hind toe and claw. Australia.

Example, *Sphecotheres viridis.* (Vieill., 'Gal.,' pl. 147.)

M. Lesson, in his 'Table Méthodique,' makes the *Turdusinées,* the fifth family of the Dentirostral birds, consist of the following genera:—

Turdus (Linn.), including *Merula, Turdus,* and *Ixos; Cinclus; Cinclosoma; Dulus; Sturnella; Timalia; Dasyornis; Jora; Pitta; Myiothera; Brachypteryx; Grallina; Acridotheres; Psaroides; Mimetes; Oriolus;* and *Sericulus.* The position assigned to the family is between the *Ampelidées* and the *Menurées* (Mænura).

The Prince of Musignano, in his 'Geographical and Comparative List of the Birds of Europe and North America' (1838), places the '*Turdidæ*' between the '*Certhidæ*' and the *Muscicapidæ,* and assigns to the first the following subfamilies and genera.

Subfam. *a. Calamoherpinæ.*

Genera—*Cettia* (Bonap.); *Pseudo-luscinia* (Bonap.); *Locustella* (Ray); *Calamodyta* (Bonap.); *Cysticola* (Less.); *Erythropygia* (Smith, *Agrobates,* Sw.); *Calamoherpe* (Meyer); *Hippolais* (Brehm.). These are for the most part formed at the expense of the genera *Sylvia* and *Motacilla* (Linn.).

b. Sylvinæ.

Phyllopneuste (Meyer, *Phylloscopus,* Boie); *Melizophilus* (Leach); *Sylvia* (Lath.); *Curruca* (Brisson); *Nisoria* (Bonap.); *Accentor* (Bechst.); *Calliope* (Gould); *Luscinia* (Br., *Philomela,* Sw.).

c. Saxicolinæ.

Dandalus (Boie, *Erythaca,* Sw., *Rubecula,* Br.); *Ruticilla* (Br., *Phœnicura,* Sw.); *Saxicola* (Bechst.); *Vitiflora* (Briss., *Œnanthe,* Vieill.); *Sialia* (Sw.); *Petrocincla* (Vig., part); *Petrocossyphus* (Boie)

d. Oriolinæ.

Oriolus (Linn.).

e. Turdinæ.

Merula (Ray); *Turdus* (Linn.); *Oreocincla* (Gould); *Mimus* (Boie, *Orpheus,* Sw.); *Cinclus* (Bechst.).

f. Motacillinæ.

Anthus (Bechst.); *Budytes* (Cuv.); *Motacilla* (Linn.).

g. Parinæ.

Regulus (Ray); *Parus* (Linn.); *Mecistura* (Leach, *Paroides,* Brehm.); *Calamophilus* (Leach, *Mystacinus,* Brehm.); *Ægithalus* (Vig., *Pendulinus,* Cuv.).

h. Sylvicolinæ.

Parula (Bonap.); *Trichas* (Sw.); *Vermivora* (Sw.); *Seiurus* (Sw.); *Sylvicola* (Sw.); *Wilsonia* (Bonap.); *Culicivora* (Sw.).

We have thus endeavoured to lay before the reader the views of some of the leading ornithologists respecting the arrangement of the *Thrushes.* The student will find a very extensive and well-arranged collection of the family in the museum of the Zoological Society of London.

MERU'LIUS, a genus of Fungi, deriving its name from Merula, a blackbird, some of the species being black. The character of the genus is to have a veiny or sinuous plaited hymenium, with the folds confluent with the pileus, and forming angular unequal perforations. Its only interest is derived from one of the species being a common cause of dry-rot. This plant, the *Merulius lachrymans* of Fries, and the *Boletus lachrymans* of Sowerby's 'Fungi,' t. 113, is very common on rotten wood in vaults and cellars, among the timbers of ships, and in similar damp situations where there is not a free circulation of air. In general it is found without fructification, its thallus, or spawn, being the only part developed, and resembling a white, dry, cottony matter, consolidated into a substance like leather. The fructification is composed of fine yellow orange or reddish-brown plicæ, so arranged as to have the appearance of perforations, and occasionally producing 'pendent processes like inverted cones:' it usually forms a circle varying from one to eight inches in diameter, and when perfect the cavities contain drops of clear water, which have given rise to the specific name. The only known means of preventing the attacks of this and other fungi upon timber is a free circulation of dry air, or the impregnation of wood with corrosive

sublimate, a process now called Kyanizing, after Mr. Kyan, who invented it.

MERVILLE. [Nord.]

MERYCOTHE'RIUM, the name applied by M. Bojanus to a genus of fossil *Mammalia*, founded on three *fossil* teeth, according to the authority of the person who sold them to him. Bojanus records one species under the name of *Merycotherium Sibiricum*.

Cuvier (*Oss. Foss.*) remarks that if these teeth are really fossil, and from Siberia, this would be the first authentic example of such remains belonging to the genus *Camelus*. He observes that their size, their form (which is longer than it is wide), and the absence of an 'arête,' or small cone, between the columns, leave no doubt as to their generic character. Those of the Giraffe are more square, and with a small point, as in the stags; while those of the Ox have a cylindrical 'arête,' or ridge. Cuvier further states that Bojanus, who has very well remarked this general resemblance, has also noticed some differences which have appeared to him sufficient to justify a new name for the animal; but the French zoologist observes that Bojanus proposes this distinction with doubt, and declares his readiness to renounce it, if it should be established that those teeth belonged to a camel, a gigantic sheep, or an antelope (the only genera in fact which want ridges between the columns).

Cuvier thinks that the differences of which Bojanus speaks are owing to the skulls of the Camels examined by the latter, as points of comparison, being the heads of individuals much older than that to which the teeth in question belonged. A Dromedary only a little older, and whose teeth were nearly in the same state of detrition, appeared to Cuvier to present no difference, save that of individuality. He remarks that they are, as Bojanus truly pointed out, the penultimate and antepenultimate molars of the left side of the upper jaw, and that it remains to show in what beds they were found, and to search for other bones of the animal, in order to see whether they will furnish any specific character. Cuvier concludes by stating that M. Marcel de Serres, professor of mineralogy at Montpellier, had just communicated to him a drawing of a fossil femur from the environs of that city, which resembled much, in the parts of it which were preserved, that of a Camel. [Camel, vol. vi., p. 191.]

Notwithstanding Cuvier's opinion, which is worthy of all respect, there are those who still think that *Merycotherium* is a distinct genus. See Bojan., 'Nov. Act. Acad. Leop. Nat. Cur.,' xii., tab. 21, f. 1-8.

MERZLIAKOV, ALEXIUS PHEDOROVITCH, a Russian writer, more distinguished as a critic than as a poet, though not without talent in the latter character, was born at Dalmatova, in the government of Perm (where his father was a wealthy merchant), in 1778. In his fourteenth year he recommended himself to Catherine II. by an ode on the peace with Sweden, and the empress ordered him to be sent to the university of Moscow, where he was placed under the charge of Kheraskov [Kheraskov], and in 1798 was made professor of eloquence and poetry. In 1805 he quitted Moscow for the northern capital, where he held a similar professorship in the university. It was at St. Petersburg that, at the suggestion of Prince Galitzin, he commenced a popular course of lectures on literature, which were numerously attended, and obtained for him a high reputation with the public. These lectures, which were held twice a week during the winter at Galitzin's house, were then a novelty, and were the more interesting to his auditors, because the critic discussed at length the merits of the principal Russian poets and prose-writers.

His own productions consist chiefly of translations, among which are Aristotle's 'Poetic,' Virgil's 'Eclogues,' select scenes from the Greek tragedians, Eschenburg's 'Theory of Literature,' and Tasso's 'Gierusalemme.' Among his original poems, his shorter lyric pieces and songs are the best, the latter more especially, for they breathe strong national feeling, and have accordingly acquired more than a transitory popularity. Merzliakov died in 1826 or 1827.

MESA'PUS. (Zoology.) [Salicoques.]

MESEMBRYA'CEÆ, a natural order of Polypetalous Exogens, consisting of herbaceous and shrubby plants inhabiting various parts of the world, in very dry temperate climates, but especially the Cape of Good Hope, where the species are extremely numerous. They are succulent plants, with an inferior, many-celled, polyspermous ovary, numerous narrow petals, indefinite stamens, and a fruit splitting into regular stellate valves. The common Ice-plant of the gardens, Mesembryanthemum crystallinum, so called because its cuticle is elevated in the form of multitudes of crystalline points, is burnt in the Canaries for the sake of its ashes, which the Spaniards import in large quantities for their glass-works under the name of *Barilla Moradera*. Another species, the M. nodiflorum, is used in Egypt for the same purpose, and also in the manufacture of Marocco leather. This and the other species are chiefly found in sandy, desert, arid places, where they flourish in the absence of other vegetation, and afford a grateful food to cattle, which browse upon them. M. emarcidum, according to Burnett, is fermented by the Hottentots, when it becomes narcotic, and is chewed by those people like tobacco. Only four genera seem admissible into the order; the others referred to it under the name of Ficoideæ chiefly belonging to Tetragoniaceæ; but Mesembryanthemum, one of the admitted genera, alone comprehends more than 300 species.



Mesembryanthemum albidum,

1, a ripe fruit; 2, a vertical section of a flower.

MESENTERI'PORA. [Polypiaria Membranacea.]

MESENTERY is the membrane by which the intestines are attached to the posterior wall of the abdomen. It consists of a double layer of fine cellular and adipose tissue, which is attached to the abdominal wall by a comparatively narrow origin, and becoming gradually wider, spreads out like a fan, to be attached to the whole length of the canal of the small intestines. Between its layers the arteries pass to the intestines, and the veins and lacteals return from them.

The other abdominal organs are attached to the walls of that cavity and to each other by layers of membrane similar to the mesentery. Those which belong to the colon are called the meso-colon; those of the rectum the meso-rectum, &c.; while those which connect the stomach with the spleen and liver are named respectively the gastro-splenic and the gastro-hepatic, or lesser omentum.

MESMER. [Animal Magnetism.]

MESODESMA, M. Deshayes's name for a genus of Veneridæ (*Erycina*, Lam.).

MESOLABIUM, an old name for any geometrical construction or proportion for finding two mean proportionals between two given lines.

MESOLE occurs massive and globular or reniform. Structure radiating from a centre, fibrous, foliated. Hardness 3·5. Colour white, greyish, or yellowish white. Translucent. Lustre pearly or silky. Specific gravity 2·35 to 2·4. It is found in Sweden and the Faroe Islands.

Analysis by—

	Hisinger.	Berzelius
Silica	42·17	42·60
Alumina	27·00	28·00
Soda	10·19	5·63
Lime	9·00	11·43
Water	11·77	12·70
	100·13	100·36

MESOLITE (Needle-stone) occurs crystallized and massive. Primary form a right rhombic prism. Cleavage parallel to the lateral faces of the primary form. Fracture conchoidal, uneven. Scratches fluor-spar, and is scratched by felspar. Colour white. Lustre vitreous. Transparent. Specific gravity 2·25.

Before the blow-pipe it becomes opaque, swells, and often fuses into a colourless glass; with borax it fuses difficultly.

It occurs in Iceland, Greenland, Finland, &c.

Analysis by—

	Fuchs and Gehlen.	Berzelius.
Silica	47·0	45·80
Alumina	25·9	26·50
Lime	9·8	9·87
Soda	5·4	5·40
Water	12·3	12·30
	100·4	99·87

MESOMPHYX, M. Rafinesque's name for a genus which he proposes to separate from *Helix* of authors.

MESOPOTA'MIA (Μεσοποταμία, called in the Old Testament *Aram-naharaim*, אֲרַם נַהֲרַיִם, that is, 'Aram,' or 'Syria between the two rivers'), the antient name of the country lying between the Tigris and Euphrates, was bounded on the north by Mount Masius (*Karajeh Dagh*), a branch of Mount Taurus, and on the south by the Median wall and the canals which connected the Tigris and Euphrates, by which it was separated from Babylonia. (Strabo, xv., p. 746, Casaubon; Ptol., v. 18; Plin., v. 13, vi. 9.) The name of Mesopotamia, which was never employed to designate any political division, did not come into use till after the time of the Macedonian conquest of Asia. The southern part of Mesopotamia Xenophon calls Arabia (*Anab.*, i. 5, § 1); and other writers included it, especially the northern part, under the general name of Syria. (Strabo, p. 737.) It was considered by the Romans a division of Syria. (Mela, i. 11; Pliny, v. 13.) It is called by the Arabs in the present day *Al Jezira*, 'the island.'

Mesopotamia may be divided into two parts, the physical features of which differ greatly. The northern part, from Mount Masius to about 35½° N. lat., is a fertile country watered by the Chaboras and the Mygdonius; the southern part, from the neighbourhood of Circesium to the Median wall, is a flat and desert country, which Xenophon has described in the 'Anabasis.' 'The country,' he says, 'was a plain throughout (i. 5, § 1, 2), level as the sea, and full of wormwood (ἀψινθίου); whatever other shrubs or reeds it contained had all a sweet aromatic smell, but there was no timber in it. There were all kinds of wild animals in it; the most numerous were wild asses, and not a few ostriches; there were also in it bustards and antelopes.' It was inhabited in the time of Pliny and Strabo by predatory tribes of Arabs called Scenitiæ, who were afterwards known under the name of Saracens. (Strabo, xvi., p. 747; Pliny, vi. 28, xxiii. 6.)

Little is known of the history of Mesopotamia till it became a province of the Persian empire. *Cushan-rishthathaim*, who is mentioned in *Judges* (iii. 8, 10) as king of Mesopotamia, appears to have been only a petty prince of a district east of the Euphrates. In the time of Hezekiah the different states of Mesopotamia were subject to the Assyrians (2 *Kings*, xix. 13), and subsequently belonged in succession to the Chaldæan, Persian, and Syro-Macedonian monarchies.

The northern part of Mesopotamia was divided into two parts by the river Aborras or Chaboras (*Khabour*), called Araxes by Xenophon (*Anab.*, i. 4, § 19), which rises in Mount Masius, and receiving the Mygdonius (*al Huali*) on the east, flows into the Euphrates at Circesium. Of these divisions the western was called Osroene, and the eastern Mygdonia.

The chief town of Mygdonia was Nisibis, also called Antiochia Mygdonica (*Nisibin*), situated on the river Mygdonius, in the midst of a fertile plain at the foot of Mount Masius. It was surrounded by three brick walls, and was very strongly fortified. Sapor was repulsed in three separate attacks upon the town, A.D. 338, 346, 350; but it was ceded to him by treaty in 363. The Zoba of the Old Testament (1 *Sam.*, xiv. 47; 2 *Sam.*, viii. 3) is supposed to be the same town as Nisibis, since the Syriac writers frequently mention Nisibis under the former name. To the north of Nisibis was Daras (*Dara*), which was fortified by Anastasius I. (A.D. 506), who gave to it the name of Anastasiopolis. (Procop., *Pers.*, i. 10.) According to Niebuhr, there are considerable ruins both of Nisibis and Daras.

The chief town of Osroene was Edessa (*Orfa*), in the north-west of the province, nine geographical miles from the Euphrates. This town, which was also called Antiochia and Callirrhoe (Plin., v. 21), is supposed to be the Erech (אֶרֶךְ) of the Old Testament. (*Gen.*, x. 10.) Edessa suffered greatly by an earthquake in the time of Justinian, who rebuilt a considerable part of the town, and gave it the name of Justinopolis. Orfa was plundered by the army of Timur in 1393; but it soon recovered its former importance. It contains at present about 40,000 inhabitants; and is about three miles in circumference.

At the distance of two days' journey, according to Niebuhr, south-east of Orfa, was the antient town of Charræ (*Harran*), the Haran (חָרָן) of the Scriptures, where Abraham's family dwelt after they had left Ur of the Chaldees. (*Gen.*, xi. 31; xii. 5; xxvii. 43; xxviii. 10; xxix. 4.) In the time of Hezekiah, Haran had been conquered by the Assyrians. (2 *Kings*, xix. 12; *Is.*, xxxvii. 12.) It is mentioned by Ezekiel as a place of commercial importance (xxvii. 23). Charræ is memorable in Roman history for the defeat of Crassus. (Dion. Cassius, xl. 25; Pliny, v. 21; Lucan, i. 104.)

Circesium (*Kerkesiah*), at the union of the Euphrates and Aborras, was a very antient town: it is called Carchemish (כַּרְכְּמִישׁ) in the Old Testament. (*Is.*, x. 9; *Jer.*, xlvi. 2; 2 *Chron.*, xxxv. 20.) It was strongly fortified by Diocletian. (Ammian., xxiii. 5.) A little to the north of Circesium, near Thapsacus, was an antient ford across the Euphrates.

MESOTYPE (Natrolite) occurs crystallized and massive. Primary form a right rhombic prism. Cleavage parallel to the primary faces. Fracture conchoidal, uneven. Scratches calcareous spar. Some crystals become electrical by friction. Colour white, with shades of grey, yellow, and red; colour of streak white. Lustre vitreous. Translucent, transparent. Specific gravity 2·249.

Massive varieties globular and reniform. Structure fibrous, diverging. Lustre pearly.

By the blow-pipe fuses with ebullition into a spongy enamel. Gelatinizes in nitric acid.

Found in Ireland, Scotland, Iceland, the Faroe Islands, &c., in trap, basaltic, and porphyritic rocks, and also in the cavities of the more antient lavas of Vesuvius.

Analysis of a specimen from Faroe by Smithson:—

Silica	49·0
Alumina	27·0
Soda	17·0
Water	9·6
	102·6

MESPILUS is a genus of Pomaceous plants, distinguished from Pyrus by the putamen of the carpels being bony, and their points spread open so as to give the fruit a cup-shaped appearance. In this restricted sense it is confined to those fruit-trees which are vulgarly called Medlars, whose astringent fruit does not become eatable till it has begun to arrive at that stage of decomposition which is called *bletting*. The word Mespilus has however been sometimes employed as a general name for all Pomaceous plants whose fruit has a hard putamen; it was used in this sense by Dioscorides, whose μέσπιλον ἀρωνία, or τρίκοκκον, was either Cratægus tanacetifolia, as Sibthorp believed, because he found that species still called τρικοκκιά by the modern Greeks, or C. Aronia, as Sprengel conjectures; while his μέσπιλον ἕτερόν, or ἐπιμηλίδα, was the modern Mespilus germanica, or common cultivated medlar.

There are only two species of Mespilus proper the one Mespilus grandiflora, an ornamental tree common in shrubberies; the other M. germanica, a native of the woods

and wild places of middle and southern Europe, which furnishes all the varieties of *Medlar*. These are the Large Dutch, the Nottingham or Common, and the Stoneless. The first is preferred on account of its large size, but the Nottingham possesses the finest acidity; the Stoneless is easily distinguished by its small size and the character implied by its name. The trees may be propagated by either grafting or budding upon their own species, or upon the White Thorn, Quince, or Pear. By adopting the Pear as a stock, the straightest stems can be obtained. The branches of the Medlar naturally assume so tortuous an appearance, that any attempt to produce uniform regularity by pruning would only produce injurious effects. Pruning should be performed only with a view to general symmetry, the balancing of the top (which is apt to incline all to one side), and a judicious thinning where the branches are overcrowded. It is necessary to observe that the fruit is produced at the extremities of the branches, and therefore in pruning they must not be shortened.

The fruit, when first gathered, is extremely austere; but this austerity is changed soon after gathering into an agreeable acidity. When in a soft pulpy state, it is fit for use, and, preserved by the tough skin, will continue so for some time; but a sort of mouldiness generally makes it appearance at the stalk, and as soon as it is observed the fruit may be pronounced unfit for use. Dipping the stalk in brine would doubtless prove of advantage in preventing the attack of fungi on that part.

Mespilus japonica, the Loquat, is now called Eriobotrya japonica, Mesp. Amelanchier is Amelanchier vulgaris, and M. Cotoneaster is Cotoneaster vulgaris.

MESSALINA. [CLAUDIUS NERO.]

MESSALLA, or with his full name, MARCUS VALERIUS MESSALLA CORVINUS, was born B.C. 59, in the same year as Livy. It would appear from a passage in Cicero's letters that he went to Athens in his fifteenth year to study. (*Ep. Att.*, xii. 32.) He was opposed in early life to the party of Antony and Octavianus (Augustus), and was in consequence included in the proscription of the second triumvirate, B.C. 43 (Dion, xlvii. 11; App., *Civ.*, iv. 38); but after the battle of Philippi, he contrived to make his peace with the conquerors, and was subsequently advanced by Augustus to offices of great trust and power. He accompanied Augustus in his campaign against Sextus Pompeius, B.C. 36, and on his return to Rome was made augur for the services he had rendered in that war. The military talents of Messalla appear to have been highly valued by Augustus; in B.C. 34, he subdued the Salassi and other warlike tribes which inhabited the Alps; and four years afterwards he conquered the Aquitani, to which victory Tibullus frequently alludes (i. 7; ii. 1, 33; ii. 5, 117). In the two following years he was sent by Augustus to Egypt and various parts of Asia on important public business; and on his return, B.C. 27, he obtained the honours of a triumph on account of his conquest of Aquitania. He was consul B.C. 31, and was appointed prefect of Rome B.C. 26. He died about A.D. 11.

Messalla was one of the most celebrated orators of his time; he is frequently mentioned by Quintilian in terms of the highest praise (*Inst. Orat.*, x. 1; compare Hor., *Sat.* i., 10, 29; *Ars Poet.*, 370); and the author of the dialogue *De Oratoribus* considers him even superior to Cicero in grace and elegance of expression (c. 18). Messalla also appears to have paid attention to the study of language, since Quintilian informs us that he had not only written treatises on separate words, but even on separate letters. (*Inst. Orat.*, i. 7; compare ix. 4.) He was a great patron of literature in general, and appears to have conferred no small benefits on Tibullus, who frequently celebrates the praises of his patron with as much subserviency as the other poets of the Augustan age.

MESSENE. [MESSENIA.]

MESSENGERS, KING'S, certain officers employed under the secretaries of state, who are kept in readiness to carry despatches both at home and abroad. They are not now so often employed as formerly in serving the secretaries' warrants for the apprehension of persons for high-treason or other grave offences against the state. Formerly too it was not unusual for them to keep the prisoners they apprehended at their own houses. A remarkable instance of this practice is detailed in the 'Post-Boy' newspaper of 1713. 'London, Jan. 10.—Yesterday morning the Morocco ambassador was taken into the custody of one of her majesty's messengers, by way of reprisal for his master's ordering and committing to slavery several of her majesty's subjects.' In the same paper, July 14, 1713, we read, 'The emperor of Morocco having released those of her majesty's subjects that had been carried into slavery, Don Bentura de Zari, his ambassador, who was in custody of Mr. Chapman, the messenger, by way of reprisal, was on Saturday last set at liberty.' So that his excellency must have passed six months in the messenger's custody.

MESSE'NIA (Μεσσηνία), a country of antient Greece, was bounded on the east by Laconica, on the north by Elis and Arcadia, and was surrounded by the sea on the western and southern sides. It was separated from Laconica by the mountain-chain of Taygetus; and from Elis and Arcadia by the river Neda and the high land which runs between the bed of the Neda and the sources of the Pamisus. [ARCADIA.] Its area is calculated by Mr. Clinton at 1162 square miles (*Fasti Hell.*, ii., p. 385), which is about the area of Staffordshire.

Messenia is described by Pausanias as the most fertile province in Peloponnesus (iv. 15, § 3); and Euripides, in a passage quoted by Strabo (viii., p. 366), speaks of it as a land well watered, very fertile, with beautiful pastures for cattle, and possessing a climate neither too cold in winter nor too hot in summer. The western part of Messenia is drained by the river Pamisus, which rises in the mountains between Arcadia and Messenia, and flows southward into the Messenian bay (Gulf of Koroni). The basin of the Pamisus is divided into two distinct parts, which are separated from each other on the east by some high land which stretches from Taygetus to the Pamisus, and on the western side of the river by Mount Ithome. The upper part, usually called the plain of Stenyclerus, is of small extent and moderate fertility; but the lower part south of Ithome is an extensive plain, celebrated in antient times for its great fertility, whence it was frequently called *Macaria*, or the 'blessed.' Leake describes it as covered in the present day with plantations of the vine, the fig, and the mulberry, and 'as rich in cultivation as can well be imagined.' (*Travels in the Morea*, i., p. 352.) The western part of Messenia is diversified by hills and valleys, but contains no high mountains.

Messenia, called in Homer Messene, is said by Pausanias to have derived its name from Messene, the wife of Polycaon, the first king of the country, who is described as the younger son of Lelex, king of Laconica (iv. 1, § 1, 2). After the lapse of five generations, the sovereignty is said to have passed into the hands of Perieres, the son of Æolus. At the time of the Trojan war Messenia appears to have been subject to Menelaus, with the exception of Pylus and probably part of the western coast, which was under the dominion of Nestor. After the death of Menelaus, the Neleid princes of Pylus are said by Strabo (viii., p. 359) to have obtained the whole of the country. On the division of the Peloponnesus, after the Dorian conquest under the Heraclidæ, Messenia fell to the share of Cresphontes, who fixed his capital in Stenyclerus, and divided the country into five districts. (Strabo, p. 361.) Pylus however appears to have retained its independence till a much later time.

In the middle of the eighth century before the Christian æra, a series of disputes and skirmishes arose on the borders of Messenia and Laconica, which gave rise to a confirmed hatred between the two nations. Prompted by this feeling, the Spartans are said to have bound themselves by an oath never to return home till Messenia was subdued; and they commenced the contest by a midnight attack on Ampheia, a frontier town, which they took, and put the inhabitants to the sword. This was the commencement of what is called the first Messenian war, the date of which is usually given, though it cannot be fixed with certainty, as B.C. 743. After a contest of twenty years, during which the Messenian king Aristodemus distinguished himself by deeds of heroic valour, the Messenians were subdued and reduced to the condition of the Laconian helots. After bearing the yoke for thirty-nine years, the Messenians took up arms against their oppressors, B.C. 685, under the conduct of Aristomenes, a noble youth of the royal blood. [ARISTOMENES.] The Messenians however were again subdued, B.C. 668; and those who remained in their native country were treated with the greatest rigour. The majority of freemen however withdrew from Messenia, and a considerable number, under the two sons of Aristomenes, sailed to Italy, and settled at Rhegium. They afterwards obtained possession of Zancle, on the opposite coast of Sicily, and called it

Messene, which has retained the same name (*Messina*) to the present day.

The Messenians again revolted in B.C. 464. This war, usually called the third Messenian war, lasted ten years; at the end of which time, the Messenians, who had occupied the strongly fortified mountain of Ithome, surrendered on condition of being allowed to retire from the Peloponnesus. The Athenians, who were not at that time on good terms with Sparta, gladly allowed them to settle at Naupactus, a town at the entrance of the Corinthian gulf, which they had lately taken from the Locri Ozolæ. (Thucyd., i., 101, 103; Paus., iv., 24, § 2; Diod., xi. 70.) This place however the Messenians were obliged to quit, when, at the end of the Peloponnesian war, the Spartans became masters of Greece; but after the supremacy of Sparta had been overthrown by the battle of Leuctra, Epaminondas formed the design of restoring the independence of Messenia, and accordingly sent messengers to Italy, Sicily, and all parts of Greece, to invite the long-exiled Messenians to return to their native country. Numbers obeyed the summons, and in B.C. 369 a town was built at the foot of Ithome, which they called Messene. The independence of the Messenians was guaranteed by the peace concluded B.C. 361; and Messenia continued to remain an independent state till the dissolution of the Achæan confederacy. In the Messenian state, as restored by Epaminondas, the antient national manners are said to have been retained; and the dialect remained, up to the time of Pausanias, the purest Doric that was spoken in the Peloponnesus (iv. 27, § 5; Müller's *Dorians*, ii., p. 421, Engl. Transl.).

The chief towns on the western coast were Pylos and Mothone, or Methone. The bay of Pylos (*Navarino*), which is protected from the swell of the sea by the island of Sphacteria (*Sphagia*), is the best harbour in the Peloponnesus. Pylos was situated at the foot of Mount Ægaleus, according to Strabo, and must not be confounded with the fortress which was erected by the Athenians in the Peloponnesian war at the northern entrance of the bay, on the spot called Coryphasium by the Lacedæmonians. (Thucyd., iv. 103, 104.) Mothone, or Methone (*Modon*), is said by Pausanias (iv. 35, § 1) to have been antiently called Pedasus, a town mentioned by Homer: it appears to have been a place of some importance in the time of Pausanias. Passing the promontory Acritas (*Cape Gallo*), we enter upon the Messenian Gulf, at present called Koroni: forty stadia north of Acritas was Asine (Paus., iv. 34, § 7), originally inhabited by the Dryopes: following the coast, we come to Colonides, forty stadia north of Asine; and afterwards to Æpea, which was called Corone after the restoration of the Messenians. At the head of the gulf, and east of the river Nedon, was Pheræ, or Pharæ, which was annexed to Laconica by Augustus (Paus., iv. 30, § 2); and on the eastern coast of the gulf were Abia, which is mentioned by Homer, according to Pausanias (iv. 30, § 1), under the name of Ira, and Leuctrum or Leuctra, which belonged at one time to Laconica. (Strabo, p. 361; compare Tac., *Ann.*, iv. 43.) It is difficult to determine the boundaries of Laconica and Messenia, as they differed at various times. Müller makes the river Nedon, near Pharæ, the antient frontier line (*Dorians*, ii., p. 460); but in the time of Pausanias, the boundary was a woody hollow called Chœrius, twenty stadia south of Abia (iv. 30, § 1). Strabo blames Euripides for making the river Pamisus the boundary (p. 366); but perhaps Euripides referred to a small river of the same name, which Strabo himself tells us was in the vicinity of Leuctrum (p. 361).

The only town inland of any importance was Messene, situated, as already mentioned, at the foot of Mount Ithome, on the summit of which was the citadel. Strabo speaks of this citadel and of Acrocorinthus as the two strongest places in Peloponnesus (p. 361); and the account of Pausanias, who praises the strong fortifications of the town, is confirmed by the solid and beautiful masonry which remains to the present day.

MESSIAH (מָשִׁיחַ) is a Hebrew word, of the same signification as the Greek Χριστός (Christ) *anointed*. In the Old Testament the word is repeatedly applied to persons who were consecrated to the service of God in some sacred office. Thus the Jewish priests, prophets, and kings are called *anointed* (Messiah), or *the anointed of God*. From this general meaning the word has passed into a particular use, referring to the illustrious personage whom the antient Jews expected, and whom their descendants still expect, to confer some signal blessings on their nation and the world. The word is found in this sense twice in the Old Testament, in *Psalm* ii. 2, and in *Daniel*, ix. 25, 26.

The expectation of the Messiah, first excited by the promise given to Eve after the fall of man (*Genesis*, iii. 15), may be traced from the exclamation of Eve at the birth of Cain, 'I have gotten a man from Jehovah,' or 'a man Jehovah' (*Gen.*, iv. 1), down through the patriarchal history, the Mosaic law, and the whole series of the Jewish prophets; and it is very generally admitted that remnants of the early belief upon this subject are plainly seen in the religion and traditions of nearly all heathen nations. For information on these traditions, see Dr. J. P. Smith's *Scripture Testimony to the Messiah*, book ii., c. 2; and Bp. Horsley's *Dissertation on the Prophecies of the Messiah, dispersed among the Heathen.*

The belief of the antient Jews respecting the person and office of the Messiah is of course derived from the passages of the Old Testament which are understood as predictions concerning him. An elaborate examination of all such passages occupies the 4th chapter of the 2nd book of Dr. Smith's *Scripture Testimony to the Messiah*, and the following is his summary of the results of the inquiry (*Ibid.*, ch. v.) 'From these sources we have learned, that the Messiah was to be a real and proper human being (*Gen.*, iii. 15; xxii. 18, &c.); the descendant of Adam, Abraham, and David (*Gen.*, xxii., 18; 2 *Sam.*, vii., 19, &c.); in some peculiar sense the offspring of the woman (*Gen.*, iii. 15); the perfectly faithful and devoted servant of God (*Is.*, xlii., 1; lii., 13); the messenger, supreme in rank above all others, of divine authority and grace (*Is.*, xlviii., 16); a heavenly teacher, inspired with the fulness of divine gifts and qualifications (*Is.*, xi., 2); the great and universal lawgiver, who should be the author and promulgator of a new, holy, and happy government over the moral principles, characters, and actions of men (*Deut.*, xviii., 18, 19; *Is.*, ix., 7); a high priest, after a new and most exalted model (*Ps.*, cx., 4); the adviser of the wisest counsels (*Is.*, ix., 6); the pacificator and reconciler of rebellious man to God, and of men among themselves (*Ibid.*); the kind and powerful Saviour from all moral and natural evil (2 *Sam.*, xxiii., 1-7; *Job*, xix., 23-27; *Is.*, xl., 10; xlv., 21). The divine oracles have also informed us that, in the execution of these benevolent purposes, he should undergo the severest sufferings from the malice of the original tempter, from the ingratitude and disobedience of men, and from the especial circumstance of his devoting himself a voluntary sacrifice to procure the highest benefits to those of mankind who should concur in his plan of mercy and holiness (*Gen.*, iii., 15; *Psalms*, xxii., lxix.; *Is.*, lii., liii.; *Zech.*, xii., 10). They have assured us that, from his deep distresses, he should emerge to glory, victory, and triumph; that he should possess power, authority, and dominion, terrible to his determined adversaries, but full of blessing and happiness to his obedient followers; that he should gradually extend those benefits to all nations; and that his beneficent reign should be holy and spiritual in its nature, and in its duration everlasting (*Gen.*, xlix., 10; 2 *Sam.*, xxiii., 1-7; *Ps.*, ii., xlv., lxxii., cx.; *Is.*, xi., 5; *Dan.*, vii., 13, 14). The testimony of heaven likewise describes him as entitled to the appellation of *Wonderful* (*Is.*, ix., 5); since he should be, in a sense peculiar to himself, the Son of God (*Ps.*, ii., 7; *Is.*, ix., 6); as existing and acting during the patriarchal and the Jewish ages, and even from eternity (*Ps.*, xl., 7-9; *Mic.*, v., 2, and the passages which relate to the *Angel of Jehovah*); as the all-sufficient guardian and protector of his people (*Is.*, xl., 9-11, &c.); as the proper object of the various affections of piety, of devotional confidence for obtaining the most important blessings, and of religious homage from angels and men (*Ps.*, ii., 12; xcvii., 7; *Is.*, xlv., 21-25). That testimony, finally, declares him to be the eternal and immutable being (*Ps.*, cii., 25-28), the Creator (*Ps.*, cii., 25), God, the Mighty God, Adonai (*Ps.*, xlv., 6; *Is.*, ix., 6; xlv., 21), Elohim (*Is.*, vi., 1; *Mal.*, iii., 1), Jehovah (2 *Sam.*, xxiii., 4; *Is.*, vi., 5; viii., 13; xl., 3, 10; xlv., 21-25; *Zech.*, ii., iii., vi.).' See also Hengstenberg's *Christologie des Alten Testaments*.

The expectations of the Messiah among the Jews in the period between the close of the Old Testament and the birth of Christ, as indicated by the Targums, the *Apocrypha*, the *Book of Enoch*, and the writings of Philo and Josephus, were confused and often inconsistent. Respecting the doctrines of the Targums on the *Memra of Jah*, or *Word of God*, and of Philo on the *Logos*, see LOGOS. In

the *Apocrypha* the word Messiah or Christ never once occurs, and there are no passages which can be said with any certainty to refer to the Messiah, unless perhaps one in *Ecclesiasticus*, li. 10, 'I called upon the Lord, the Father of my Lord.' In the *Book of Enoch*, which was written by a Jew about B.C. 30, we have an account of a vision (evidently imitated from *Daniel*, vii. 9-14), in which the 'Son of Man' is associated with the 'Antient of Days,' and is described as a person 'to whom righteousness belongeth,' 'who will reveal all the treasures of that which is hidden,' who 'existed and whose name was called upon in the presence of the Lord of the Spirits before the world was created and for ever,' who 'will be a support to the righteous and holy' and 'the light of the nations,' before whom 'all who dwell upon the earth will fall down and worship,' who is to be a preserver and ruler, and superior to the kings of the earth, whom he will overthrow 'because they have denied the Lord of Spirits and his Messiah.' (Abp. Laurence's *Book of Enoch*, chaps. xlvi., xlviii., lxi.) From Josephus we learn nothing on the subject, a fact sufficiently accounted for by his own temporising disposition and the circumstances in which he was placed.

At the time of Christ's advent various expectations respecting the Messiah prevailed among the Jews. It is sufficiently evident from the New Testament, that, while some looked for a human prince who was deliver them from the Roman yoke and exalt them to national supremacy, others expected a divine teacher who was to confer spiritual blessings not only upon them but also on the Gentiles. (Bertholdt's *Christologia Judaeorum Jesu Apostolorumque Aetate*, and Kuinoel's *Comment. in Lib. Hist. N. T.*, *Proleg. ad Johan.*, § 7.) The opinion of the Samaritans, recorded in *John*, iv. 42, that the Messiah would be a religious teacher and 'the Saviour of the world,' is worthy of special attention, because the Samaritans received no part of the Scriptures but the Pentateuch, and were cut off from all intercourse with the Jews by national hatred. (Bishop Horsley's *Sermons*, xxiv.-xxvi.)

It is the belief of all Christians that Jesus Christ is the Messiah predicted in the Old Testament. The evidence of this fact is contained in the New Testament, especially in the four gospels, from which it appears that his lineal descent, the place, time, and other circumstances of his birth, the constitution of his person, the history of his life and death, the miracles he performed, and the doctrines he taught, all agree to the minutest particular with the prophecies respecting the Messiah. (Fuller's *Jesus the true Messiah*.)

The Jews, having rejected the claims of Jesus Christ, are still looking for the Messiah, whom they almost universally expect to be a mere man and to confer on them only temporal blessings. Most of the Rabbinical writers of the middle ages speak of two Messiahs: one, the son of David, the conquering monarch; the other, the suffering Messiah, the son of Joseph, who is to fall in battle, fighting for his countrymen againt Gog and Magog, and in this sense to die for them. This opinion may be traced up to the sixth century, and perhaps higher. In these Rabbinical writings, especially in the book *Zohar*, there are scattered valuable fragments of the more antient belief of the Jewish people on this subject. (Schöttgenii, *Horæ Hebraicæ et Talmudicæ*; and Lightfoot's *Works*.)

In different ages there have appeared numerous 'false Messiahs' (*Matt.*, xxiv. 24). Of these ecclesiastical historians reckon twenty-four, for an account of whom the reader is referred to Johannes à Lent's *History of False Messiahs*.

MESSI'NA, INTENDENZA, or Province of, comprehends the north-east extremity of Sicily, and is bounded on the west by the province of Palermo, on the south by that of Catania, on the north by the Mediterranean, and on the east by the Faro or Straits of Messina, which divide it from Calabria. The greatest length of the province is 60 miles, and its breadth 30 miles. A continuation of the mountainous ridge which runs across Sicily from west to east, known to the antients under the various names of Nebrodes, Heræi, Pelorias, &c., covers the greater part of the interior of the province, and terminates at Cape Pelorum. A number of torrents, called 'fiumare,' during the rainy season descend from both sides of the ridge, but they are nearly dry in summer. On the south-west the province of Messina skirts the base of Ætna, the mass of which belongs to the province of Catania. The province of Messina has no great plains, but it contains many valleys. Its chief products are wine, oil, and fruit of every sort. The towns of the province are—1, Messina. 2, Melazzo, the antient Mylæ, a seaport town on a promontory of the northern coast facing the Lipari islands, fifteen miles west of Messina, with a castle and 7000 inhabitants, many of whom are employed as sailors and fishermen. It exports much wine from the neighbouring districts, and also oil. The red Faro wine, which is made nearer to Messina, is better than that of the district of Melazzo. 3, Patti, on the same coast, fifteen miles south-west of Melazzo, and not far from the ruins of the antient Tyndaris, has several churches and convents, and between 4000 and 5000 inhabitants. 4, Taormina, the antient Tauromenium, on the east coast of the island, and at the north-east base of the group of Ætna, an old looking town with about 4000 inhabitants, is built upon a steep cliff towering above the sea; it has an antient theatre and other ruins scattered around. 5, Castro Reale, in a valley rich in oil and wine, has 12,000 inhabitants. 6, Randazzo, at the north base of Ætna, in a very fertile district, has 15,000 inhabitants.

The islands of Lipari are included in the administrative province of Messina. [LIPARI ISLANDS.]

MESSI'NA, the Town of, lies on the north-east coast of Sicily opposite the Calabrian coast, from which it is separated by the channel of the Faro, which is here about four miles wide, but becomes much narrower farther north opposite Faro Point, or Cape Pelorum. The town of Messina is built partly on the slope of a steep hill, and partly along the sea-shore at the foot of it. The port of Messina is formed by a strip of sandy beach projecting into the sea at the south side of the city and sweeping round in the form of a semicircle. From the sickle-like form of this strip of land, the town received from its first Greek inhabitants the name of Zankle ('curved' or 'bent'),* which was afterwards changed into that of Messene. (Thucyd. vi. 5.) On this narrow tract of land are the citadel, the lazaretto, the lighthouse, and the castle of Salvatore at the entrance of the harbour, which faces the north. The harbour, which is more than two miles in circumference, is one of the best in the Mediterranean. The larger part of the town rises in the form of a crescent on the west side of the harbour, along which is a handsome quay lined on one side by a row of fine buildings called La Palazzata: this quay constitutes the fashionable promenade of the town.

The view over the channel, the opposite coast of Calabria with its towns and villages, and the lofty Apennines behind them, and on the other side the low promontory of Faro, with its tower advancing into the sea as if to meet the Italian coast, form a splendid landscape, which is one of the finest even in the Mediterranean, a sea whose shores are remarkable for a variety of beautiful scenery. The climate of Messina, though hot in summer, is very healthy, and is not so sultry as that of Palermo or Catania.

Messina has many remarkable buildings; the cathedral, the church of La Candelara, and that of the Capuchins, contain some fine paintings. The church of Santa Maria de Graffeo belongs to the Greek clergy, whose protopapa is the spiritual head of the Greek or Epirote colonies settled in Sicily. The royal palace, the archiepiscopal palace, that of the senate, the seminary, the great hospital, the arsenal, the loggia or exchange, the granaries, the royal college, the bank, and the two theatres, are all worthy of notice. The public library, founded by Constantine Lascaris, is rich in Greek MSS. Messina is an archbishop's see, has a court of appeal for the province, a commercial tribunal, a royal college, called Accademia Carolina, for the study of law and medicine, and about 60,000 inhabitants. (Serristori, *Saggio Statistico; Nuova Guida dei Viaggiatori in Italia*, Milan, 1830.)



Coin of Dankle (Messina). British Museum.

Messina is the most trading town of Sicily; it exports oil, currants and raisins, wine, almonds, lemons, sumach,

* The name was also written 'Dankle,' as appears by the coin which accompanies this article.

lamb-skins and kid-skins, liquorice, and other produce of the island. The spinning and weaving of silk form the principal manufacture, and employ several thousand hands.

(*Saggio sù i mezzi di moltiplicare le Richezze della Sicilia*, by G. de Welz, 4to., Paris, 1822.)

For the history of Messina see HIERON II., and SICILY.

METACENTRE is a point in a floating body, the position of which, relative to that of the centre of gravity, determines the conditions for the stability or instability of the equilibrium of that body. The equilibrium is *stable*, if, when the body receives a slight disturbance from its position, it tends, by the combined action of its own weight and the pressure of the fluid in which it is partially immersed, to re-adjust itself in that position after some oscillations; and the equilibrium is *instable* if a slight disturbance will cause the body to overset and acquire a different position, which will then necessarily be one of stable equilibrium.

The surface of a heavy fluid at rest is a horizontal plane; the portion of this plane which we may imagine to be within the floating body is called the *plane of floatation*.

When a body floating on a fluid is in equilibrium, the weight of the body applied downwards at its centre of gravity must be equal and exactly opposite to the pressure of the fluid, or, which is the same, to a force equal to the weight of the displaced fluid, applied upwards at the centre of gravity of this portion of the fluid; hence in this position the right line joining these two centres is vertical, and is called the *line of support*.

When the body is slightly disturbed from this position, the plane of floatation evidently alters its position in the floating body; the centre of gravity of the part immersed also changes, and the *thrust* of the fluid will in general no longer pass through the centre of gravity of the whole body. The magnitude of this force will however undergo but a very small change, and the body is now subjected to the action of two forces which are equal and contrary, but no longer directly opposite.

The figure and density of a body may however possibly be such that the thrust of the fluid may, after the disturbance, continue to pass through the centre of gravity of the body. The equilibrium is then said to be *indifferent*, inasmuch as the disturbance communicated only produces a new position of equilibrium. This happens when a body floats in a fluid of equal density with itself, and in other cases, as in a floating sphere. We may observe that if the disturbance of the equilibrium consisted merely of an elevation or depression of the centre of gravity, small vertical oscillations would be the consequence: the disturbance considered here is supposed such as to tend to turn the body *round* its centre of gravity, or to make the original line of support deviate in a vertical plane through a very small angle; this line is called the *axis* passing through the centre of gravity.

When the position of the body is thus disturbed, if the line of thrust when produced upwards meets the abovenamed axis, the point of intersection is called the *metacentre*. The consequent motion of the body will then be the same as if the centre of gravity were fixed, and the thrust applied vertically at the metacentre; hence if the metacentre be *above* the centre of gravity, the thrust tends to re-adjust the axis, and the equilibrium is stable; if *below*, that force tends to carry the axis farther from its original place, and the equilibrium is instable: if the two centres coincide, the equilibrium is indifferent. We give an example:—

Fig. 1.

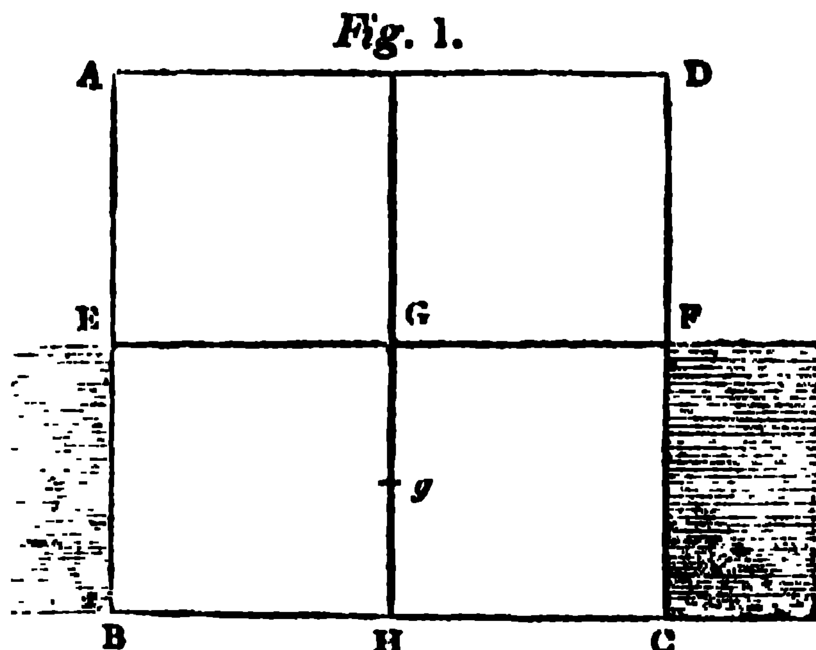


Fig. 1. ABCD is a vertical *square* section passing through G, the centre of gravity of a rectangular beam floating on a fluid of twice its specific gravity, this section being at right angles to the faces of the beam; therefore GH = ½ AB; and if gH = ¼ AB, g is the centre of gravity of the fluid displaced, Gg is the line of support, and EF the plane of floatation.

Fig. 2.

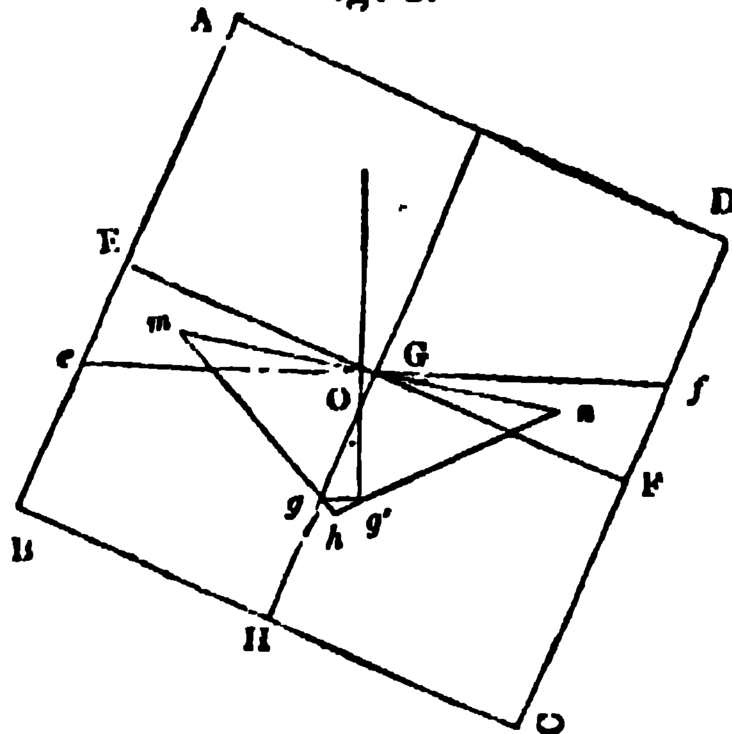


Fig. 2 represents the same body turned round its centre of gravity through a small angle FGf or θ. Let GF = 1; we must find g', the centre of gravity of efCB, and draw g'O vertical or perpendicular to ef, cutting the axis GH in O the metacentre. Let m, n, be the centres of gravity of the portions EGe, FGf, and h that of the portion eGFCB, then $hg : gm$ :: solid EGe : solid eGFCB; and $hg' : g'n$ :: solid FGf : solid eGFCB; but the solids EGe, FGf, are equal: hence $hg : gm :: hg' : g'n$, therefore gg' is parallel to mn, or nearly horizontal, and $= mn, \frac{\text{solid EG}e}{\text{solid EFCB}}$ nearly. Now $mn = 2\,\text{G}m = \frac{4}{3}$, and solid EG$e = \frac{1}{2}\theta \times$ length, solid EFCB = 2 × length; therefore $gg' = \frac{4}{3} \times \frac{1}{4} \times \theta = \frac{\theta}{3}$: but $\angle g\text{O}g' = \theta$; therefore $g\text{O} = \frac{1}{3}$, or $\text{GO} = \frac{\text{GH}}{6}$: hence the equilibrium is instable. If the equilibrium were stable, the times of the oscillations would be found by supposing the thrust applied at O, the point G remaining fixed.

METAGALLIC ACID is prepared by the partial decomposition of gallic acid by quickly heating it up to about 480°. Carbonic acid and water are formed and separated, and a black, shining, tasteless compound is left, which is not dissolved by water, but is easily taken up by the alkalis ammonia, potash, and soda in solution. It also decomposes the solutions of the alkaline carbonates, expelling the carbonic acid. Metagallate of potash gives insoluble precipitates with the salts of barytes and strontia, and also with many metallic salts.

It is composed of—

Three equivalents of hydrogen . .	3
Twelve equivalents of carbon . .	72
Three equivalents of oxygen . .	24
Equivalent	99

METALLURGY is the art of separating metals from their ores. The processes vary for every metal, and are described under each.

METALS. The metals form a numerous and highly important class of simple or elementary bodies. Different opinions are entertained as to their number, which arises from the circumstance that a few substances are regarded as metallic in their nature by some chemists, while by others their claim to this title is either doubted or denied; thus by Berzelius a substance which he discovered and called *selenium* is regarded as a metal, but it is not so ranked by any English chemist; again, the base of silica is by some classed as a metal, and by them termed *silicium*; whereas many consider it as more nearly allied in nature to boron, and call it *silicon*.

We shall consider neither of these bodies as metals. Independently of them, the metals, including those which have been longest known, as well as some whose claims are even yet somewhat doubtful, amount to forty-two; they are, given alphabetically, as follows:—aluminium, antimony, arsenic, barium, bismuth, cadmium, calcium, cerium, chromium, cobalt, columbium, copper, glucinium, gold, iridium, iron, latanium, lead, lithium, magnesium, manganese, mercury, molybden, nickel, osmium, palladium, platina, potassium, rhodium, silver, sodium, strontium, tellurium,

thorium, tin, titanium, tungsten, uranium, vanadium, yttrium, zinc, zirconium.

The general properties of the metals are, that, with the single exception of mercury, they are all solid at the usual temperature of the air, and the colour of most of them is greyish white. Silver is of a pure white; tin, cadmium, platina, palladium, mercury, iridium, are white, with a slight shade of grey; antimony is white, with a slight bluish tint; cobalt, nickel, iron, manganese, and rhodium are more grey; lead and zinc are of a bluish grey; chromium, molybden, and tungsten are of a pure grey colour; uranium is brown; gold, yellow; copper and tellurium, yellowish-red; and columbium appears to have the same colour.*

The lustre of metals is great and peculiar, and is well known by the name of the *metallic lustre;* they differ however very considerably in the degree in which they possess this property. Professor Leslie arranges them as follows, the first possessing the greatest lustre:—platina, silver, mercury, gold, copper, tin, and lead. When reduced to a state of minute division, as by filing, or by any other means, the metallic lustre is lost, but the colour remains. The metals are generally reckoned perfectly opaque, even when reduced to thin leaves; but it is found that gold-leaf, which is $\frac{1}{300000}$ part of an inch thick, suffers light to pass through it, and it has a green colour; it is therefore extremely probable that all metals, if they could be rendered equally thin, would also be translucent. There are some metals, such as lead, tin, copper, and iron, which, when rubbed, emit a peculiar and disagreeable smell. There are others which yield a peculiar odour when heated and vaporized; this is especially the case with arsenic, and it occurs also with antimony; the greater number of the metals are however inodorous; a few of them possess taste, but it is in all cases disagreeable.

Formerly great density and a specific gravity superior to that of other bodies were considered as among the principal characteristics of metals. But the brilliant discoveries of Sir H. Davy have proved that substances which are even lighter than water, potassium and sodium for example, possess every property which belongs to metals. The density of all the metals has not been ascertained. Beginning with the lightest, their specific gravities are as follows:—potassium 0·865, sodium 0·972, titanium 5·300, columbium 5·610, arsenic 5·884, chromium 5·900, tellurium 6·115, antimony 6·702, manganese 7·05, zinc 7·191, iron 7·770, cobalt 7·834, nickel 8·279, cadmium 8·694, copper 8·958, uranium 9·000, bismuth 9·830, silver 10·474, rhodium 10·649, lead 11·445, palladium 11·860, mercury 13·568, tungsten 17·600, iridium 18·680, gold 19·361, platinum 21·530.

The following metals are ductile or malleable, arranged alphabetically:—

Cadmium	Iron	Osmium?	Silver
Copper	Lead	Palladium	Sodium
Gold	Mercury	Platina	Tin
Iridium?	Nickel	Potassium	Zinc

The following metals are so brittle that the greater number of them may be reduced to powder:—

Antimony	Chromium	Molybden	Tungsten
Arsenic	Cobalt	Rhodium	Uranium
Bismuth	Columbium	Tellurium	
Cerium	Manganese	Titanium	

The degrees of ductility and malleability of those metals which possess those properties are very different, and some metals are so totally devoid of them that they may be broken by the hammer, and even reduced to powder. Ductility is that property by which metals are susceptible of being drawn into wire, and malleability is that by which their form is changed, so that they are beaten into thin leaves under the hammer or extended by pressure. The annexed tables show that the metals mentioned in them do not follow in the same order as to those properties.

Order of Ductility.	Order of Malleability.
Gold	Gold
Silver	Silver
Platina	Copper
Iron	Tin
Copper	Platina
Zinc	Lead
Tin	Zinc
Lead	Iron

* This statement of colours is taken from Berthier, 'Traité des Essais par la Voie Sèche,' tome i., p. 527. It will perhaps appear on examination that scarcely any two authors agree precisely as to the colours of metals.

The ductility and malleability of metals are in general considerably increased by heat, but only to a certain extent. There are some metals which are malleable only between two very near degrees of temperature: such, for example, is the case with zinc.

The degree of tenacity of metals is indicated by the powers of their wires in supporting a given weight. The following weights are capable of being sustained by wires of the annexed metals about 0·840 of a line in diameter:—

	lbs. dec. avoir. pts.
Iron	549·250
Copper	302·278
Platina	274·320
Silver	187·137
Gold	150·753
Zinc	109·540
Tin	34·630
Lead	27·621

There are only few metals which are very hard when they are pure. The following table exhibits some of them arranged according to the degree in which they possess this property, according to Professor Brande:—

Titanium	Silver
Rhodium	Bismuth
Tungsten	Gold
Palladium	Zinc
Manganese	Antimony
Iron	Cobalt
Nickel	Tin
Platina	Arsenic
Copper	Lead

M. Dumas however arranges the metals somewhat differently: he begins with manganese as the hardest, which certainly is not the case; for titanium, which he does not mention at all, should precede that and every other metal. M. Dumas's statement is as follows:—

Manganese	Harder than tempered steel.
Chromium, Rhodium	Not scratched by glass.
Nickel, Cobalt, Iron, Antimony, Zinc	Scratched by glass.
Palladium, Platina, Copper, Gold, Silver, Tellurium, Bismuth, Cadmium, Tin	Scratched by carbonate of lime.
Lead	Scratched by the nail.
Potassium, Sodium	Soft as wax.
Mercury	Liquid.

The elasticity and sonorousness of metals are generally associated with their degree of hardness. There are not however any metals which are by themselves either very elastic or sonorous; but there are alloys which possess these properties in a high degree, as for example those of copper and tin.

The structure of metals is sometimes lamellar, sometimes granular, and frequently crystalline: indeed, some of them, and more especially copper, occur crystallized in the form of the cube and its varieties. Bismuth is a metal which may be artificially crystallized in cubes with great facility.

As to the action of the imponderable bodies upon the metals, it must be premised that no particular effect has been attributed to the agency of light.

The metals are good conductors of heat; they differ however greatly in the celerity with which it pervades them. According to M. Despretz, assuming the conducting power of gold as a standard, that of the undermentioned metals is as follows:

Gold	10,000	Iron	3,743
Silver	9,730	Zinc	3,638
Platina	9,810	Tin	3,039
Copper	8,932	Lead	1,796

Capacity for Heat.—MM. Petit and Dulong have deter-

mined with great care the calorific capacity of a great number of metals for 1° of the centigrade thermometer, that of water being taken as unity. Their results are:

Bismuth	0·0288	Zinc	0·0927
Lead .	0·0293	Tellurium	0·0912
Gold .	0·0298	Copper	0·0949
Platina	0·0314	Iron	0·1000
Mercury	0·0330	Nickel	0·1038
Tin .	0·0515	Cobalt	0·1498
Silver	0·0557		

MM. Petit and Dulong deduce from their experiments the important conclusions that the atoms of all substances have the same capacity for heat, or at least that this capacity bears a very simple relation to the weights of the atoms.

Dilatability.—Immediately that heat pervades the metals, and before it fuses them, it expands them in all directions. This dilatation is different in each metal; it varies also in the same metal with every degree of the thermometric scale; but from the freezing to the boiling point of water it may however be regarded as nearly constant; between these points the linear dilatation for the following metals is such as stated by the authorities named:—

	Laplace and Lavoisier.	Dalton and Davy.
Zinc .	..	0·00296
Lead .	0·00285	..
Tin .	0·00217	0·00278
Silver .	0·00191	0·00238
Copper .	0·00172	0·00170
Gold .	0·00147	0·00194
Steel (tempered)	..	0·00112
Steel (not tempered)	0·00108	..
Platina .	0·00086	0·00087
Mercury .	..	0·00835

Fusibility.—The fusing point of metals varies extremely, as will appear from the following table copied from Turner's 'Chemistry:'—

		Fahr.	Authority.
	Mercury	−39°	Different Chemists.
Fusible below a red heat.	Potassium	136	Gay Lussac & Thenard.
	Sodium	190	Gay Lussac & Thenard.
	Tin	442	Crichton.
	Bismuth	497	Crichton.
	Lead	612	Crichton.
	Tellurium, rather less fusible than lead .		Klaproth.
	Arsenic, undetermined		
	Zinc	773	Daniell.
	Antimony, a little below red heat . .		
	Cadmium . about	442	Stromeyer.
Infusible below a red heat.	Silver	1873	Daniell.
	Copper	1996	Daniell.
	Gold	2016	Daniell.
	Cobalt, rather less fusible than iron . .		
	Iron, cast	2786	Daniell.
	Iron, malleable . .	Require the highest heat of a smith's forge.	
	Manganese . . .	Require the highest heat of a smith's forge.	
	Nickel, nearly the same as cobalt		
	Palladium		
	Molybden, Uranium, Tungsten, Chromium	Almost infusible, and not to be procured in buttons by the heat of a smith's forge.	Fusible by the oxy-hydrogen blowpipe.
	Titanium, Cerium, Osmium, Iridium, Rhodium, Platina, Columbium	Infusible in the heat of a smith's forge.	

Volatility.—Metals also differ in this respect. Some metals are volatilized at moderate degrees of heat; among these are mercury, cadmium, arsenic, tellurium, zinc, potassium, and sodium; but there are others which may be exposed to the most intense heat of a wind furnace without being at all vaporized.

Electricity.—Becquerel has given the following table of the relative conducting powers of the metals for electricity, the wires of the several metals being of equal diameter:—

Copper	100	Iron	15·80
Gold	93·60	Tin	15·50
Silver	73·60	Lead	8·30
Zinc	28·50	Mercury	3·45
Platina	16·40	Potassium	1·33

According to Pouillet, each of the following metals is positive with relation to that which follows it:—zinc, lead, tin, iron, antimony, bismuth, copper, mercury, silver, gold, tellurium, palladium, platina.

Magnetism.—There are two metals only which are capable of being rendered permanently magnetic, namely, iron and nickel; the former of these only is met with possessing this property in nature; it is an oxide of iron, and commonly called the *loadstone*. Most of the metals combine with each other and form compounds differing very materially in properties from their constituent metals. [ALLOYS.]

Oxygen and Metals.—All metals unite with oxygen, but with different degrees of facility and affinity; most of them combine with more than one proportion of oxygen and some of them with several proportions. The nature of the compounds formed is extremely various; thus some metals form with oxygen comparatively inert compounds or mere oxides, such are iron and zinc; others, such as potassium and sodium, when oxidized become alkalis; while arsenic and chromium form acids with this element. It has been already observed that some metals unite with several porportions of oxygen, and these may be mere oxides, as in the case of iron; or oxides and acids, as occurs with manganese; but there is no case of any metal forming a mere oxide and an alkali with different proportions of oxygen, or an acid and an alkali under the same circumstances.

Azote and Metals.—No permanent compound of these is known.

Hydrogen and Metals do not readily combine; there are only two remarkable compounds; these result from the union of hydrogen with arsenic and with tellurium.

Chlorine and Metals combine with great facility, and the compounds are extremely important; every metal is indeed susceptible of this combination; chlorine possesses the remarkable property of forming in general volatile compounds with the metals.

Bromine, sulphur, iodine, and phosphorus combine with most of the metals: for an account of their properties, as well as those which the metals form with the preceding elements, see each particular metal. The action of the air, of water, and the acids, upon the metals, is extremely various, and depends greatly upon their respective affinity for oxygen; few of them are oxidized in dry air, but many of them tarnish and some oxidize readily in it when moist, of which iron is an example. Some metals, as potassium, sodium, and manganese, decompose water even at common temperatures, combining with its oxygen and evolving the hydrogen; others, as iron and zinc, require to be strongly heated, or the presence of an acid, to effect this decomposition.

Although most metals are dissolved by acids, yet platina and gold are exceptions to it, these and some others requiring chlorine, and generally in the nascent state called *aqua regia*. Few metals however are acted upon by acids without the presence of water, and in some instances the water, in others the acid, and often both, suffer decomposition, and it is to be observed that no metal dissolves in acid unless it be either previously oxidized or acquire oxygen from the mixture of acid or water in which the solution takes place: the salts formed are in many cases of the highest importance in chemical investigations, in the chemical arts, and in medicine.

METAMO'RPHOSIS OF ORGANS, in the Vegetable Kingdom, consists in an adaptation of one and the same organ to several different purposes; connected with which are changes in form, size, colour, and other particulars.

The plan upon which the development of plants takes place, notwithstanding the infinite variety observable in the vegetable kingdom, is extremely simple, and is executed by

modifications of one kind of elementary tissue, and one kind of external organ. In the beginning, that is to say, in its embryo state, a plant is only a mass of spheroidal cellular tissue possessing vitality. But as soon as it is excited into growth, some of the cells lengthen and become woody tissue; others lengthen and generate an elastic spiral thread in their inside, acquiring the form and property of spiral vessels, while numerous other changes of a similar nature are produced; to each of which variations peculiar properties are inherent, such as the conveyance of fluids in particular directions, the conveyance of air, the strengthening of certain parts, the defence of others, and so on. In like manner a plant in the beginning consists of nothing but an axis of growth composed of fibro-vascular tissue enclosed in cellular tissue; to give it lungs and a stomach, without which it could not live, points upon its surface are expanded into leaves; these organs at particular parts of the system alter their texture, colour, and form, and become floral envelopes, or they contract, and organise in their interior a substance called pollen, when they become male organs, or finally, they roll up, and convert themselves into hollow bodies, within which are generated ovules or young seeds. These circumstances rightly understood, are found to afford the clearest explanation of the plan upon which the most complicated modes of vegetable organisation are produced, and especially of those anomalous or monstrous cases whose occurrence is so common and difficult of explanation in the absence of the light thrown upon them by Morphology, or the theory of vegetable metamorphosis.

This subject originated in the second volume of the tenth edition of the *Systema Naturæ*, published in 1759, in which Linnæus thus expresses himself:—'Leaves are the creation of the *present* year, bracts of the *second*, calyx of the *third*, petals of the *fourth*, stamens of the *fifth*, and the stamens are succeeded by the pistil. This is apparent from Ornithogalums, luxuriant and proliferous plants, double flowers, and Cardui.'

In December, 1760, these propositions were sustained by Linnæus in a thesis called the 'Prolepsis Plantarum.' He commences by remarking that 'as soon as leaves have expanded themselves in spring, a bud is observable in the axil of each. This bud swells as the year advances, and in time becomes manifestly composed of little scales: in the autumn the leaves fall off, but the bud remains, and in the succeeding spring swells, disengages itself from its envelopes, and becomes lengthened: when its outer scales have dried up and fallen off, the inner ones are expanded into leaves, which are separated by a gradual extension of the young branch, and presently each new leaf is found to contain in its bosom a little scaly bud, which in the following season will also be developed as a branch, with other leaves and other buds. Now, when we see a tree adorned with leaves, and in the bosom of these leaves provided with its little buds, we naturally inquire—of what do these buds consist? Can it be of rudimentary leaves,' each with its budlets, the latter of other leaves and buds, and so on to infinity, or at least as far as the extension of the plant is likely to proceed? Nature organises living beings out of such minute particles, and even from fluids themselves, that the best eye may in vain seek to penetrate far into her mysteries. I shall however endeavour to show that the composition of buds does not extend further at one time than provision for six years; just as, among animals, we find the little *Volvox globator* containing within the mother its children, grandchildren, great-grand-children, and great-great-grand-children down to the sixth generation.'

The defects of this theory consisted, firstly, in its not accounting for the modifications of the pistil; and, secondly, in the fanciful supposition that the organs of fructification are prepared six years beforehand, and that their peculiar appearance is owing to the time of this development being anticipated by some unknown but ever-acting cause. It was this which probably caused the whole theory to be generally neglected. It was however maintained by Ludwig and Wolff; the latter of whom in particular improved so much upon the speculation of Linnæus, by rejecting what was fanciful and supplying to a certain extent an explanation of the origin of the pistil, that his paper in the *Novi Commentarii Academiæ Petropolitanæ* for 1768 would undoubtedly have deserved to be considered the beginning of a new æra in botanical philosophy if it had been known to botanists. But as it was introduced into a paper upon the formation of the intestines of animals, it does not appear ever to have attracted attention until it was discovered by Miquel a few years ago.

It is in reality to the celebrated poet Göthe that the honour justly belongs of having brought before the world in a clear and philosophical manner the doctrine of all the parts of a plant being reducible to the axis and its appendages, and consequently of having proved, to use his own words, that vegetables 'develop themselves out of themselves progressively.' By this means he led to the discovery of the real laws of structure, and of the analogies which exist between one thing and another in different tribes of plants; thus laying the foundation of vegetable comparative anatomy by 'establishing a principle in harmony with all the laws obeyed by millions of isolated facts.'

A perfect plant consists of branches successively produced out of each other from one common stock, and each furnished with exactly the same organs or appendages as its predecessor. When the fructification is produced, an alteration takes place in the extremity of the fructifying branch, which is incapable, generally speaking, of further prolongation; but as the branches, before they bore fruit, were repetitions the one of the other, so are the branches bearing fruit also repetitions of each other. If a thousand sterile or a thousand fertile branches from the same tree are compared together, they will be found to be formed upon the same uniform plan, and to accord in every essential particular. Each branch is also, under favourable circumstances, capable of itself becoming a separate individual, as is found by cuttings, budding, grafting, and other horticultural processes. This being the case, it follows that what is proved of one branch is true of all other branches.

It is also known that the elementary organs used by nature in the construction of vegetables are essentially the same; that the plan upon which these organs are combined, however various their modifications, is also uniform; that the fluids all move, the secretions all take place, the functions are all regulated upon one simple plan; in short, that all the variations we see in the vegetable world are governed by a few simple laws, which, however obscurely they may be understood by us, evidently take effect with the most perfect uniformity.

Hence it is not only true that what can be demonstrated of one branch is true of all other branches of a particular individual, but also that whatever can be shown to be the principles that govern the structure of one individual, will also be true of all other individuals. It is particularly requisite that this should be clearly understood in order that a just estimate may be formed of the nature of the proofs to be adduced with respect to the doctrines of morphology. Whatever can be demonstrated to be true with regard to one single individual is true of all other individuals: whatever is proved with reference to one organ is proved by implication as to the same organ in all other individuals whatsoever.

Moreover, the fact of one organ being readily transformed into another organ is in itself a strong presumption of the identity of their origin and nature; for it does not happen that one part assumes the appearance and functions of another, if they are originally different. Thus, while the functions of the hand may be performed by the feet, as we know they occasionally are in animals, nothing leads the heart to perform the function or assume the appearance of the liver, or the liver of any other organ. This is one of the arguments of Linnæus.

The first of the organs which are formed by a modification of leaves are the bracts; these bodies are intermediate between the leaves and the calyx. Their nature is extremely various; sometimes they have a greater resemblance to the leaves, and sometimes to the calyx. In some roses, as R. canina, they are obviously dilated petioles, to which a leaflet now and then is attached; in other species, as R. spinosissima, they differ in no respect from the other leaves. In the tulip a bract is occasionally present upon the scape, a little below the flower; this is always of a nature partaking both of the leaf and the flower. In Abies excelsa the purple scale-like bracts often become gradually narrower, and acquire a green colour like leaves. It has been stated by some botanists, that bracts are distinguishable from leaves by not producing buds in their axils; but the inaccuracy of such a distinction is apparent from a variety of cases. In Polygonum viviparum, and all viviparous plants, the flowers themselves are converted into buds within the

bracts. There is a bud in the axil of every bract of the rose. The common daisy often bears buds in the axils of the bracts of its involucre; in which state it is commonly known in gardens by the name of 'hen and chickens.' In the permanent monster called Muscari monstrosum a small cluster of branches covered with minute imbricated coloured leaves resembling bracts is produced in lieu of each flower. Here all the parts of the fructification, instead of remaining at rest to perform their functions, are attempting, but in vain, to become organs of vegetation; or, in other words, to assume that state from which, for the purpose of perpetuating the species, they had been metamorphosed by nature. Hence it is clear that bracts cannot be essentially distinguished from leaves.

With the calyx begins the flower properly so named; it forms what some morphologists call the outer whorl of the fructification, and with it commences a new order of leaves, namely, those of the fructification, said to be distinguished from the leaves of vegetation by their constantly verticillate arrangement, and by the want of buds in their axils. With the leaves of the fructification all power of further increase ceases: the energies of the plant being diverted from increasing the individual to multiplying the species. The general resemblance of the calyx to the ordinary leaves of vegetation is well known: its green colour, and tendency to develop itself into as many leaves as it consists of divisions, especially in double roses, is so notorious that it need not be insisted on. In the case of Mesembryanthemum barbatum, noticed by Linnæus, there is no difference whatsoever between the leaves of the calyx and those of the stem. The resemblance however between the calyx and the stem-leaves is often not apparent; but the identity of the calyx and bracts is usually more obvious. In Cereus the transition from the one to the other is so gradual that no one can say where the distinction lies; and in numberless Ericas the resemblance of the bracts and calyx is perfect. The divisions of the calyx are also occasionally gemmiferous. A case is mentioned by Röper, in which one of the sepals of Caltha palustris was separated from the rest, and furnished with a bud. And Du Petit Thouars speaks of a specimen of Brassica napus on which branches were produced within the calyx. A monster of Herreria parviflora has been seen of the same nature. (Lindley, *Introduction to Botany*, ed. 2, p. 533.) From this it is apparent that the divisions of the calyx are not only not distinguishable from bracts, but that there is often a strong tendency in the former to assume the ordinary appearance of leaves. There is however another point to which it is necessary to advert, in order to complete the proof of the identity of calyx and leaves; this is, the verticillate arrangement of the former. Leaves are either opposite, alternate, or whorled; and these differences depend wholly upon their greater or less degree of approximation. If the leaves of a plant are rightly considered, they will be found to be inserted spirally round a common axis; that is to say, a line drawn from the base of the lower leaf to that of the one above it, thence continued to the next, and so on, would have a spiral direction. When leaves become approximated by pairs, the spire is interrupted, and the leaves are opposite; let the interruption be a little greater, and the leaves become ternate; and if the interruption be very considerable, what is called a whorl is produced, in which several leaves are placed opposite to each other round a common axis, as in Galium. Now a whorl of this nature is exactly of the nature of a calyx, only it surrounds the axis of the plant, instead of terminating it. As we know that such approximations often take place in the stem in the direct line of growth, where the propulsion of the matter of vegetation exists in its greatest activity, there is no difficulty in comprehending the possibility of such an approximation constantly existing at the end of the system of growth, where the propulsion of the matter of vegetation ceases. But the calyx and more inner whorls of the fructification do not always retain their verticillate position; on the contrary, they occasionally separate from each other and assume the same position with regard to the axis of vegetation as is naturally proper to the leaves. This is particularly striking in a very common permanent monster of Lilium album, known in the gardens by the name of the double white lily. In this plant the whole verticillation of the parts of fructification is destroyed; the axis is not stopped by a pistil, but is elongated into a stem, around which the white leaves of the calyx are alternately imbricated; and in double tulips the outer whorl, representing the calyx, frequently loses its verticillate arrangement, and becomes imbricated like the leaves of a stem. The same structure also occurs in the double white Fritillaria meleagris. Hence it cannot be doubted that the calyx consists of leaves in a particular state.

The corolla forms the second line or whorl of the fructification. It consists of several divisions, usually not green, and always alternate with those of the calyx. It is a series of leaves arising within those of the calyx, from which it is sometimes indeed very easy to distinguish it; but from which it is so often impossible to discriminate it, that the difference between the calyx and corolla has been one of the most debatable subjects in botany. No limits can be found in Cereus; the same is true of Illicium, and several similar plants. In all Liliaceæ, Orchidaceæ, and Zingiberaceæ, the only distinction that can be drawn between the calyx and corolla is, that the one originates within the other; they are alike in figure, colour, texture, odour, and function. Whatever therefore has been proved to be true of the calyx is also true of the corolla. There are also cases in which the petals have actually reverted to the state of leaves. In a Campanula Rapunculus, seen by Röper, the corolla had become five green leaves like those of the calyx; the same was found in a Verbascum pyramidatum, described by Du Petit Thouars; proliferous flowers of Geum and Rosa, in which the petals were converted into leaves, are adduced by Linnæus.

The third whorl or series of fructification is occupied by the stamens. These often consist of a single row, equal in number to the divisions of the corolla, with which they are in that case alternate. The exceptions to this in flowers with a definite number of stamens are not numerous; and such as do occur are to be considered as wanting the outer row of stamens, and developing the second row instead. Thus in Primulaceæ, in which the stamens are opposite to the petals, and therefore belonging to a second whorl, the first makes its appearance in Schwenckia in the form of clavate or subulate processes arising from the sinuses of the limb. These and similar processes, which are far from uncommon in plants, and which are known by various names, such as scales of the orifice of the corolla, glands, nectary, cup, &c., are in most cases metamorphosed stamens. In Narcissus the cup is formed of three stamens of the first row, become petaloid and united at their margins; while the six which form the second and third rows are in their usual state and within the tube. This is shown, firstly, by the frequent divisions of this cup into three lobes, which then alternate with the petals; secondly, by a distinct tendency in double Narcissi, particularly N. poeticus, to produce abortive anthers on the margin of the lobes of the cup; and thirdly, by the genus Brodiæa and its allies. In that genus the crown of the original species consists of three petaloid pieces, not united into a cup, as in Narcissus, but wholly separate from each other; in Leucocoryne ixioides these pieces are not petaloid, but clavate; and in Leucocoryne odorata the species have the same figure as in L. ixioides, but almost constantly bear more or less perfect anthers. That the anthers are mere alterations of the margins of petals, there is no difficulty in demonstrating. In Nymphæa the passage from the one to the other may be distinctly traced. In double roses the precise nature of this metamorphosis is shown in a very instructive way. If any double rose is examined, it will be seen that those petals which are next the stamens contract their claw into the form of a filament, and a distortion of the upper part, or limb, also takes place; the two sides become membranous, and put on the colour and texture of the anther; and sometimes the perfect lobe of an anther will be found on one side of a petal, and the half-formed, mis-shapen rudiment of another on the opposite side. In Aquilegia vulgaris this transformation is still more curious, but equally distinct: the petals of that plant consist of a long sessile purple horn or bag, with a spreading margin; while the stamens consist of a slender filament, bearing a small oblong, two-celled, yellow anther. In single and regularly-formed flowers nothing can be more unlike than the petals and stamens; but in double flowers the transition is complete; the petals, which first begin to change, provide themselves with slender ungues; the next contract their margin, and acquire a still longer unguis; in the next the purple margin disappears entirely; two yellow lobes like the cells of the anther take

its place, and the horn, diminished in size, no longer proceeds from the base, as in the genuine petal, but from the apex of the now filiform unguis. In the last transition the lobes of the anther are more fully formed, and the horn is almost contracted within the dimensions of the connective, retaining however its purple colour: the next stage is the perfect stamen. The conversion of stamens into green leaves is far more uncommon: this indeed very rarely occurs. It was seen by Röper in the Campanula Rapunculus already referred to; and Du Petit Thouars found the stamens of Brassica napus converted into branches bearing verticillate leaves. In Plantago major and Sieversia montana permanent instances are known of a conversion of the stamens, with all the other floral organs, into leaves. Thus it appears that the stamens, like the petals, calyx, and bracteæ, are merely modified leaves.

The disk is so frequently absent, and is of so obscure a nature, that few morphologists take it into their consideration. In many plants it consists of a mere annular fleshy ring encompassing the base of the ovary; in others it forms a sort of cup, in which the ovaries are enclosed, as in certain Pæonies, and it very frequently makes its appearance in the form of hypogynous glands or scales: it is almost always between the stamens and pistil. That it is not an organ of a distinct nature may be inferred from its having no existence in a large number of flowers; but if it is not an organ of itself, it must be a modification of something else, and in that view, from its situation, it would be referrible either to the stamens or pistil. It has so little connection with the latter, from which it always separates at maturity, that it can scarcely belong to it. With the stamens it has a stronger relation: it consists of the same cellular substance as the connective of the anthers, is very often of the same colour; whenever it separates into what are called hypogynous glands or scales, these always alternate with the innermost series of stamens. In the Pæony the disk may in some measure be compared to the inner row of scales which exist between the stamens and pistil of the nearly-related genus Aquilegia. Dunal has noticed half the disk of a Cistus bearing stamens; and a variety of instances may be adduced of an insensible gradation from the stamens to the most rudimentary state of the organ.

The fifth and last series of the fructification is the pistil. The simple pistil, that of the pea for instance, consists of an ovary, bearing its ovules on one side in two parallel contiguous rows, and at its upper extremity tapering into a style, which terminates in a stigma. If this organ be further examined, it will be found that there is a suture running down each edge from the style to the base; it will be also seen that the ovules are attached to one of these sutures, and that the style is an elongation of the other: further, it will be perceived that the two sides of the ovary are traversed by veins emanating from the suture that terminates in the style, and that these veins take a slightly ascending direction towards the suture which bears the ovules. Now if, when the pod of the pea is half grown, it be laid open through the latter suture, all these circumstances will at that time be distinctly visible; and if it then be compared with one of the leaflets of the plant, it will be apparent that the suture that bears ovules answers to the two edges of the leaf, the suture without ovules to the midrib, and the style to the mucro. Hence it might, without further evidence, be suspected that the ovary is an alteration of the leaf; but if the inquiry be carried further in other plants, this suspicion becomes converted into certainty. In the first place, the suture without ovules, which has been said to be the midrib, is always external with respect to the axis of fructification, as would be the case with the midrib of a leaf folded up and terminating the fructification. In the next place, nothing is more common than to find the pistil converted either into petals or into leaves. Its change into petals is to be found in numerous double flowers, as for example double Narcissi, Hibiscus Rosa sinensis, wallflowers, ranunculuses, saxifrages, and others. These however only show its tendency to revert to petals as the representatives of leaves. The cases of its reverting to other organs are much more instructive. In the double Ulex Europæus the ovary is extremely like one of the segments of the calyx; its ovuliferous suture is not closed; in the room of ovules it sometimes bears little yellow processes like miniature petals, and its back corresponds to what would be the back of the calyx; no style or stigma is visible; sometimes two of these metamorphosed ovaries are present: in that case the sutures which should bear ovules are opposite to each other, just as the inflexed margins of two opposite leaves would be. In Kerria Japonica, which is only known in our gardens in a double state, the ovaries are uniformly little miniature leaves, with serrated margins corresponding to the ovuliferous suture of the ovary, and an elongated point representing the style; their interior is occupied by other smaller leaves. Nothing is more common among roses than to find the ovaries converted into perfect leaves; in such cases the margins uniformly occupy the place of the ovuliferous suture, and the midrib that of the sterile suture. But the most instructive and satisfactory proof of the pistil being merely a modified leaf is to be found in the common double cherry of the gardens. In this plant the place of the ovary is usually occupied by a leaf altogether similar to those of the branches, but much smaller: it is folded together; its margins are serrated, and, in consequence of the folding, placed so as to touch each other; and they occupy the place of the ovuliferous suture of a real pistil. The midrib of this leaf corresponds to the station of the sterile suture of the ovary, and is not only lengthened into a process representing a style, but is actually terminated by a stigma. There is thus a greater identity of function between the pistil and the other series of the fructification than would at first appear probable. The pistil is seldom indeed found converted into stamens; but it often takes upon itself the form of petals, as has been shown above; and although cases are very rare of pistils bearing pollen, yet several instances are known of ovules being borne by the stamens. This occurs continually in Sempervivum tectorum.

It appears then that there is not only a continuous uninterrupted passage from the leaves to the bracts, from bracts to calyx, from calyx to corolla, from corolla to stamens, and from stamens to pistil, from which circumstance alone the origin of all these organs might have been referred to the leaves, but that there is also a continual tendency on the part of every one of them to revert to the form of a leaf.

The pistil in a state of composition differs much in appearance from its simple form. At section 78 of *Die Metamorphose der Planzen* of Göthe, are the following remarkable words:—'Keeping in view the observations that have now been made, there will be no difficulty in discovering the leaf in the seed-vessel, notwithstanding the variable structure of that part and its peculiar combinations. Thus, the pod is a leaf which is folded up and grown together at its edges, and the capsule consists of several leaves grown together; and the compound fruit is composed of several leaves united round a common centre, their sides being opened so as to form a communication between them, and their edges adhering together. This is obvious from capsules, which, when ripe, split asunder, at which time each portion is a separate pod. It is also shown by different species of one genus, in which modifications exist of the principle on which their fruit is formed: for instance, the capsules of Nigella orientalis consist of pods assembled round a centre, and partially united; in Nigella damascena their union is complete.'

As it may thus be proved that all the parts of a flower are merely modified leaves, the following propositions may be stated to constitute the basis of morphology:—

'Every flower, with its peduncle and bracteolæ, being the development of a flower-bud, and flower-buds being altogether analogous to leaf-buds, it follows as a corollary, that every flower, with its peduncle and bracteolæ, is a metamorphosed branch.

'And further, the flowers being abortive branches, whatever the laws are of the arrangement of branches with respect to each other, the same will be the laws of the arrangement of flowers with respect to each other.

'In consequence of a flower and its peduncle being a branch in a particular state, the rudimentary or metamorphosed leaves which constitute bracteæ, floral envelopes, and sexes, are subject to exactly the same laws of arrangement as regularly formed leaves.' (Lindley's *Outline of the First Principles of Botany*, edit. 2.)

Therefore all theories of structure inconsistent with these propositions must be vicious.

The reader who would occupy himself further with this curious subject, may consult Martius's edition of the *Œuvres d'Histoire Naturelle* de Göthe, Paris, 1837;

Miquel's *Commentatio de Organorum in Vegetabilibus Ortu et Metamorphosi*, Lugd. Bat., 1833; and Röper's Treatise *De Organis Plantarum*.

Engelmann has moreover (*De Antholysi Prodromus*) attempted to classify the principal aberrations from normal structure, and has collected a very considerable number of cases under the following heads:—

1. Retrograde metamorphosis (*Regressus*), when organs assume the state of some of those on the outside of them, as when carpels change to stamens or petals, hypogynous scales to stamens, stamens to petals or sepals, sepals to ordinary leaves, irregular structure to regular, and the like. 2. Foliaceous metamorphosis (*Virescentia*), when all the parts of a flower assume more or less completely the state of leaves. 3. Disunion (*Disjunctio*), when the parts that usually cohere are separated, as the carpels of a syncarpous pistillum, the filaments of monadelphous stamens, the petals of a monopetalous corolla, &c. 4. Dislocation (*Apostasis*): in this case the whorls of the flower are broken up by the extension of the axis. 5. Viviparousness (*Diaphysis*), when the axis is not only elongated, but continues to grow and form new parts, as in those instances where one flower grows from within another. And, finally, 6, Proliferousness (*Ecblastasis*), when buds are developed in the axils of the floral organs, so as to convert a simple flower into a mass of inflorescence. A very considerable number of instances are adduced in illustration of these divisions, and the work will be found highly useful as a collection of curious or important facts.

ME'TAPHOR (μεταφορά, literally 'a transference'), a figure of speech which renders the subject of discourse striking, by the aid of expressions primarily referring to other objects. A common kind of metaphor is that called personification, where inanimate beings are represented as endowed with life, and even with feeling, reason, &c., as 'the fields do laugh and sing,'—'stern winter.' If this kind of metaphor spiritualises the corporeal, another kind, on the contrary, embodies the spiritual, as 'the star of renown'—'the pinnacle of honour,' and so on. A third kind is little else than a shortened simile, two objects in the same sphere being brought together, only on account of their resemblance. To this kind belong such expressions as 'the silver moon'—'the golden sun,' &c., where it will be seen at once that 'silver' and 'moon,' 'gold' and 'sun,' are connected merely on account of their obvious similarity of colour and brightness. The origin of the first two kinds of metaphor is not so apparent, for though they likewise express a similarity, yet the similarity of a series of bodily objects to a series of objects merely of the mind, where there can of necessity be no sensible resemblance, is a subject for psychological investigation. The application of certain metaphors, in all languages and among all people, attracted the attention of Jean Paul Richter, who remarked that 'no nation called error, light, or truth, darkness.' If we attend to the state of language, we shall find that a great part of the commonest discourse is composed of metaphors of the second kind, and that nearly all words expressing mental states, operations, and affections are in fact metaphorical. Thus we say every day 'a man of extended views'—'a man of good capacity, acute judgment,' &c., where the words 'extended,' 'views,' 'capacity,' 'acute,' evidently belonged originally to material objects, but have been applied to things immaterial by metaphors. The circumstance that material objects are more apparent, that language seems primarily to have them for its sole objects, and that when a higher degree of reflection brings with it objects belonging to the mind alone, nothing is left but to apply in a new sense the words already formed, is sufficient to explain the use of these metaphors generally. But still the fact that such and such bodily attributes are universally predicated of such and such spiritual objects alone, may still furnish matter for consideration to the curious in psychological speculation.

METAPHYSICS, a name originally applied to those books of Aristotle which followed his 'Physics,' and which his editors called 'the books after the Physics' (μετὰ τὰ φυσικά). In modern times the word has been variously applied, and seems to assume quite a distinct meaning as employed by different authors. With the Germans, metaphysics is a science purely speculative, which soars beyond the bounds of experience. The objects of this science are supersensual ideas, unattainable by experience, and the difficulty of defining the word lies in the circumstance that the very knowledge of the ideas sought requires some proficiency in the study. Hence to one altogether unacquainted with speculative philosophy it is almost impossible to explain the meaning of the word 'metaphysics' as used in this sense. The very possibility of a science beyond experience has been denied by a great number of philosophers, and many works called metaphysical should rather be termed inquiries into the possibility of metaphysics. Thus Kant's celebrated work, the *Critik der reinen Vernunft*, is a mere inquiry into the possibility of a theoretical science of things beyond experience, which terminates with a denial of such possibility, and hence some modern philosophers have considered Kant as no metaphysician, but as a critic of the mental faculties, whose labours were to be the precursors of a new system of speculation. On the other hand, a work like Spinoza's 'Ethics' is purely metaphysical. He assumes the possibility of his science, and, proceeding from a number of axioms, speculates accordingly. Those who deny the possibility of metaphysics deny even the right to assume any axioms as applicable to a sphere beyond experience: and those who did assume them, as Spinoza, Leibnitz, and Wolf, were called by the Kantians dogmatists, in opposition to their own appellation of critics. The great point to be established prior to metaphysical speculation is the identity, or at least the necessary concurrence, of thought and being. This once established, speculative inquiry may proceed, as the results of logical investigation must in such a case, of course, concur with the nature of being itself; but the sceptics always deny the right of assuming such identity or concurrence, while on the other hand different theories have been adopted to prove them, such as those of harmony between body and spirit,—of the non-being of body altogether, except as an affection of spirit,—of an absolute identity between thought and being, &c. It may be as well to observe that the critical philosophy, which assumes nothing but the 'I' or 'ego,' and the laws of thought (Fichte deducing even the latter from the axiom, 'I am I'), has Descartes for its author, whose 'Cogito, ergo sum,' lies at the basis of most modern systems. [DESCARTES.]

In England, the word metaphysics is usually applied to denote the philosophy of mind, as distinguished from that of matter. This science treats of the association of ideas, memory, and various phenomena of mind; and as it consists merely in collecting facts and making inductions like any other experimental science, its possibility is no more questionable than that of chemistry or electricity. However, Locke's 'Essay on the Human Understanding,' as a denial of any source of knowledge other than experience, may be put at the side of Kant's 'Critik,' as containing inquiries of a similar nature, though the results be different; Berkeley's 'Idealism' may be compared with the 'Wissenschaftslehre' of Fichte, and the common-sense theory of Reid with the views of Jacobi. The philosophy of mind as an experimental science has been chiefly treated by the modern Scotch philosophers.

METASTA'SIO, PIE'TRO, was born at Rome, on the 6th of January, 1698. His father, once an opulent citizen of Assisi, afterwards a soldier, then an amanuensis, and finally a small pastrycook at Rome, was enabled, by the profits of his trade, to place his son at a little grammar-school, where he soon displayed that talent for poetry which so highly distinguished him in after-life. Before he was ten years old, says his biographer, Dr Burney, he could make verses on any subject, and it was no unusual sight to see his father's porch surrounded in the evening, after school hours, by groups listening to the poesy of a child. During one of these tuneful fits, the celebrated lawyer and critic Gravina happened to pass by, and was forcibly struck by the extraordinary talent displayed by the youthful improvvisatore. He offered the young poet money, which was refused in a manner so firm, yet so polite, that Gravina's admiration of him was increased, and he instantly formed the resolution of adopting him. The father, Felice Trapassi, willingly consented, and the next morning Pietro was consigned to the care of his patron, who changed his name to Metastasio (Μετάστασις, *mutatio*, a changing), a term expressing his situation by adoption.

Gravina immediately determined to educate his charge for the profession of the law, wishing rather that he should become an orator than a poet, well knowing that the former profession leads to fortune, and the latter, most commonly, to empty fame. He nevertheless caused him to study the

antient poets, in which pursuit his ardour and success were so great, that at the early age of fourteen he produced his tragedy *Giustino*, written after the Greek models. His patron now not only allowed but encouraged his devotion to the muses; and when Metastasio had reached his eighteenth year, Gravina accompanied him to Naples, that he might meet and sing with the most eminent improvvisatori of the day. He became a universal favourite. The harmony of his verse, the grace and dignity of his elocution, and the expressiveness of his countenance, were the topics of all conversations. Still he continued to study the law; and, to secure an opening into the only other road to preferment, entered into a minor order of priesthood.

Within two years after his arrival at Naples, his patron died, and Metastasio mourned his loss like an affectionate son. By Gravina's will he became sole possessor of all his property, consisting of 15,000 crowns, a fine library, and a little estate in the kingdom of Naples. But such was the generosity, not to call it by a harsher name, of the poet's disposition, that, in the short space of two years, all that remained to him of this property was the small landed estate. He now applied to the law, and during a whole year was most assiduous in his studies under Paglietti, a mortal enemy to the muses. But at the end of that time he was again attracted to his poetic pursuits, and produced an *Epithalamium*, at the request of the Countess of Althau, who likewise prevailed on him to write the drama *Endimione*. Under the patronage of the viceroy of Naples, he next produced *Gli Orti Esperidi* (*the Gardens of the Hesperides*), and then *Angelica*, the plot from Ariosto. The former of the two was most successful, and especially admired by Signora Bulgarini, better known as *the Romanina*. She was the first singer of her day, and performed the part of *Venus* in the favoured opera. Such were her admiration and esteem for the author, that she persuaded him to renounce the law, to take up his abode under her husband's roof, and to dedicate the whole of his energies and time to the muses and to friendship. Feeble was the struggle between Paglietti and the Romanina: he acceded to the tempting proposal, and henceforward

'Apollo beat Ma'am Themis hollow.'

His *Didone Abbandonata* was written at the request of his female friend, to whom, it has been surmised, the poet is indebted for some of the finest dramatic incidents. Such was the celebrity of this drama, that it was set by all the great Italian composers of that period, and not only established the author's fame, but brought him a large pecuniary recompense. In 1727 he accompanied the Romanina to Rome, where he produced his *Semiramide*, *Ezio*, *Alessandro nell' Indie*, *Catone in Utica*, and the opera so well known by our English version of it, *Artaserse*. But praise was nearly the whole of the reward he reaped from his labours in the pope's dominions.

In the year 1729 Metastasio received an invitation from the court of Vienna, whither he repaired, and became the successor of Apostolo Zeno, the Imperial laureate. This appointment was rendered more gratifying to him, as it was made on the recommendation of Zeno himself, who had long enjoyed the office, and had written a vast number of lyrical dramas, among which are many of the best that the Italian language can boast. [Zeno.] The stipend assigned to Metastasio was considerable for that time—3000 florins was then a large salary; and other advantages were added. This came rather opportunely, for at Rome he had suffered much from the slenderness of his income, and was often indebted to his friend for assistance. To her, when he left Italy, he entrusted his affairs, and deposited with her a small sum for the temporary support of his father, till he could make an arrangement of a permanent kind. His reception by Charles VI. was most gratifying, and promised everything for the future, a promise not disappointed. During the succeeding three years, his correspondence with his 'inestimable counsellor and friend' amounts almost to an autobiography; but in 1734 he sustained an irreparable loss by her death, who to the last proved the sincerity of her attachment by bequeathing to him, after the decease of her husband, the whole of her property, amounting to 25,000 crowns. Metastasio however, guided in this instance, as he was in every other, by the strictest rules of honour, declined to derive any advantage from the will so generously made in his favour, and immediately transferred to the husband all right to the reversionary property. What may have been the nature of the connection between the poet and Signora Bulgarini (or the Romanina), it is now impossible to say. From Metastasio's letter to the husband on the death of his wife, the sorrow expressed is in a tone of candour which looks as if there had been nothing to conceal or disguise. He says, 'I know not how to begin this letter. The tidings are so intolerable to me on many accounts, that I can devise no means to diminish the acuteness of my sufferings; therefore I trust you will not accuse me of want of feeling if I am unable to suggest to you any consolation for your loss, as I have hitherto been totally unequal to finding any for myself.' At what age the lady died is unknown, but as she was first singer at Genoa in 1712, it is likely that she was much the senior of her friend.

Metastasio's mode of life, from his first settling in Vienna till the moment of his death, was that of a poet and man of letters, who devoted his time and thoughts to the muses, to general literature, and to the conversation of persons more or less connected with his pursuits. In 1733 he produced, among other pieces, *L'Olimpiade*, which the Italians distinguish as *il divino*, and his very popular canzonetta, *La Libertà*. For the emperor's birth-day in 1734 he wrote the noble opera, so well known in every part of Europe, *La Clemenza di Tito*, which was set by the Imperial composer, Caldara, but not a vestige of the music remains. The same drama however was in 1790 chosen by Mozart, whose magic notes have assisted in bestowing on it immortality. It is not unworthy of remark, that though all the poet's operas were set as soon as written, yet not even a single piece of the original music is now known, or, we believe, to be found, except perhaps in the Imperial library of Vienna.

He continued supplying the court with lyric dramas and oratorios, and also employed himself in the production of various detached pieces of poetry, till the year 1740, when the death of the emperor brought on the long and devastating war in Germany, and thus led to the closing of the theatre, for which he had so successfully laboured. He now employed his pen in translating into blank-verse the *Ars Poetica* of Horace, together with one of his Satires and Epistles, and Juvenal's third Satire. He likewise wrote notes on the Greek tragedians, and translated a portion of Aristotle's 'Poetic,' adding a very learned, luminous, and ingenious commentary, which appeared in print after his decease. But though his dramatic labours for the Imperial city were suspended, he produced in 1744 *Antigono* for the court of Dresden, and *Ipermestra* in the same year. His health however appears now to have suffered from the anxieties occasioned by the long war, and he entertained serious thoughts of hastening back to Rome; but the return of peace operated on him like 'a charm; it removed the nervous disease which had hung on him, it restored his wonted tranquillity, and in 1751 he wrote *Il Re Pastore* for the ladies of the Imperial court, by whom it was performed, and the 'bold sentiments on the duty of sovereigns, which he ventured to put into the mouth of one of characters, do equal honour, Dr. Burney remarks, to his Imperial patrons, who could listen to them with pleasure, and to the laureate who had the courage to preach them.' His last drama was *Il Ruggiero*, performed in 1771 at Milan, on the marriage of the archduke Ferdinand.

Of Metastasio's seven sacred dramas, or oratorios, *La Passione*, *La Morte d'Abel*, and *Isacco* are best known; but all of them, Calsabigi justly observes, are as perfect as this kind of composition will allow. Of his cantatas, *La Primavera*, *La Libertà*, and *La Partenza* are admired by all who have any acquaintance with Italian poetry. His occasional short dramatic pieces, sonnets, and other miscellanies are too numerous to be mentioned here; a *catalogue raisonné* of them is given in the work whence we have drawn most of our materials for the foregoing portion of this article. (Dr. Burney's *Memoirs of Metastasio*.)

One of the occupations of the poet when far advanced in years was the preparing corrected copies for the magnificent edition of his works printed at Paris in 1780. This may be considered his last labour. On the first of April, 1782, he was attacked by symptoms of fever, alarming at his age, and on the 12th he expired. His remains were deposited in the church of St. Michael at Vienna. His property, consisting of a well furnished house, carriage, &c., many princely presents, an ample library, and 130,000

florins, he bequeathed to the son of his old friend Signor Martinetz, whose house was his first abode in Germany: but from this sum were to be deducted 20,000 florins for each of the executor's sisters, and 3000 for each of his younger brothers.

The genius of Metastasio, says Arteaga, 'may be compared to the goddess Chloris of the Greeks, who, in flying through the air, scattered roses wherever she went.' He did indeed ornament and cast a fragrance on whatever he touched. His reputation soon obscured that of Apostolo Zeno, W. Schlegel observes, because, having the same object in view, he showed more flexible talent, and knew better how to adapt himself to the views and means of the composer. A perfect purity of diction, adds the same acute critic, a grace and unalloyed delicacy, have rendered Metastasio, in the eyes of his countrymen, a classic author, the Racine of Italy. He has above all a ravishing softness in his verses designed for music. Perhaps no poet ever possessed in the same degree the gift of compressing in a short space situations so pathetic, so touching. It is said of him, by Schlegel, that in order not to endanger his originality, he carefully abstained from reading the chefs-d'œuvre of the French stage. However this may be, we will add, that in all his works it is clear that he was no imitator: his style, his chasteness, his tenderness, were his own. In deep tragedy he could not excel; he had not the power to wring the heart; his life was too serene, he was too happy in himself to imagine scenes of bitter anguish, of complicated misery; but in depicting gentle grief, that grief which does not pass the confines of reason, he has no superior. He has been described as, *par excellence*, the poet of love, but his most passionate expressions never are sullied by the slightest breathing of indelicacy. His morality is unimpeachable, is exemplary. In all his works he stands high; in his operas he is unrivalled.

METATARSUS. [SKELETON.]

METELLI, a distinguished family of the Cæcilian *gens* in antient Rome. Those most worthy of notice are—

1. Q. Cæcilius Metellus Macedonicus, who was sent when prætor (B.C. 148) into Macedonia against Andriscus, who pretended to be a son of Perseus, the last king of Macedonia, and who had excited a revolt against the Romans. In this war Andriscus was defeated and taken prisoner by Metellus. (Liv., *Epit.*, 50; Paus., vii. 13, 1; Eutrop., iv. 13.)

In B.C. 146, Metellus defeated the Achæans near Thermopylæ, and on his return to Rome obtained a triumph on account of his conquest of Macedonia. (Liv., *Epit.*, 52.) Metellus, in his consulship, B.C. 143, was sent into Spain to oppose Viriathus, who had obtained possession of the whole of Lusitania, and had defeated successively the prætors Vetilius and Plautius. Metellus remained in Spain two years, and obtained several victories, but was succeeded in the command, before the conclusion of the war, by Q. Pompeius. (Liv., *Epit.*, 52, 53; Val. Max., iii. 2, 21; vii. 4, 5; ix. 3, 7; Appian, *Iber.*, 76; Eutrop., iv. 16.)

During the censorship of Metellus and Q. Pompeius, B.C. 131, it was decreed that all citizens should be obliged to marry. The oration which Metellus delivered on this subject was extant in the time of Livy, and is referred to by Suetonius (Liv., *Epit.*, 59; Suet., *Octav.*, 89.) We are told by Livy and Pliny that when Metellus was returning one day from the Campus Martius, he was seized by command of C. Attinius Labeo, a tribune of the plebs, whom he had in his censorship expelled from the senate, and dragged to the Tarpeian rock; and that it was with the greatest difficulty that his friends were enabled to preserve his life by obtaining another tribune to put his veto upon the order of Attinius. (Liv., *Epit.*, 59; Plin., *Hist. Nat.*, vii. 45.)

Pliny refers to Metellus as an extraordinary example of human happiness. 'For besides the possession of the highest dignities,' says Pliny, 'and having obtained a surname from the conquest of Macedonia, he was carried to the funeral pile by four sons, of whom one had been prætor, three had been consuls, two had enjoyed a triumph, and one had been censor.' (*Hist. Nat.*, vii. 45.)

2. Quintus Cæcilius Metellus Numidicus derived his latter *cognomen* or surname from his victories in Numidia, whither he was sent in his consulship, B.C. 109, in order to oppose Jugurtha. He remained in Numidia, B.C. 108, as proconsul; but in the beginning of the following year he was superseded in the command by Marius, who had formerly been his *legatus*, or lieutenant-general. On his return to Rome, Metullus obtained the honour of a triumph. (Sallust, *Bell. Jugurth.*; Vell., ii. 11; Eutrop., iv. 27; Liv., *Ep.*, 65.) [JUGURTHA.]

Metellus was censor B.C. 102. He took an active part in the civil commotions of his time, and was one of the most powerful supporters of the aristocratical party. In B.C. 100 he was obliged to go into exile in consequence of opposing the measures of the tribune Saturninus; but on the execution of the latter, Metellus was recalled from exile in the following year. [MARIUS.]

3. Q. Cæcilius Metellus Pius, son of Numidicus, belonged to the same political party as his father, and supported Sulla in his contest with Marius. Metellus received especial marks of favour from Sulla, and was consul with him, B.C. 80. In B.C. 78 Metellus was sent against Sertorius in Spain, where he appears to have remained till the conclusion of the war, in B.C. 72. From the year 76 Pompey was his colleague in the command; and they triumphed together at the end of the war. [SERTORIUS.] (Vell., ii. 30; Eutrop., vi. 5; Plut., *Pomp.*) Metellus was Pontifex Maximus; and on his death, B.C. 63, in the consulship of Cicero, he was succeeded in that dignity by Julius Cæsar.

METEMPSYCHO'SIS (μετεμψύχωσις), derived from a Greek word signifying the passage or transmigration of souls, forms a part of the philosophical or religious belief of many nations. The Hindus believe that the souls of men pass after death into different bodies, either of men or animals, unless an individual has lived a most holy and religious life; in which case his soul is absorbed into the divine essence. 'The soul passes from one state to another invested with a subtile frame consisting of elementary particles, the seed or rudiment of a grosser body. Departing from that which it occupied, it ascends to the moon, where, clothed with an aqueous form, it experiences the recompense of its works; and whence it returns to occupy a new body with resulting influence of its former deeds. But he who has attained the true knowledge of God does not pass through the same stages of retreat, but proceeds directly to reunion with the Supreme Being, with which he is identified, as a river at its confluence with the sea merges therein altogether. His vital faculties and the elements of which his body consists are absorbed completely and absolutely; both name and form cease; and he becomes immortal without parts or members.'

('Extracts from the *Brahma-sûtras*, or Aphorisms on the Vedanta doctrine, by Bâdarâyana,' translated by Mr. Colebrooke, in *Trans. of the Roy. As. Soc.*, vol. ii.)

The migration of souls from one body to another also formed, as is well known, a leading feature of the Pythagorean doctrine, and seems also to have been maintained by Plato, although there is considerable difficulty in ascertaining the opinions of Plato on this subject. This doctrine was also a part of the Egyptian religious system. The Egyptians, says Herodotus (ii. 123), are the first who believed in the immortality of the soul. As soon as the body begins to decay, the soul passes from one animal to another; and when it has passed through the forms of all animals, terrestrial, aquatic, and winged, it again enters a human form. This period of transmigration is completed in 3000 years. Some of the Greeks, he adds, both in early times and more recently, have maintained this doctrine and claimed it as their own; and though he could mention names, he declines to do so.

METEOROLOGY, in its extended sense, embraces all physical causes which affect the state of the atmosphere or are affected by it. Hence it is connected with the phenomena of heat and cold, dew, rain, hail and snow, clouds, winds, auroræ boreales, haloes, parhelia, &c. The sense in which Aristotle (Μετεωρολογικά, i.) uses the term is still more extensive, comprehending, in addition to what are now called meteors, every affection (πάθος) common to the air and water, with the characters of the different parts of the earth, and their affections, as winds and earthquakes, and everything incident to such kinds of motion.

Our first inquiry shall be, what is the nature and what the probable extent of the terrestrial atmosphere? Essential as it is both to animal and vegetable life, to the distribution of heat, and to various modifications of light, the knowledge of its nature and composition is eminently useful. The air, though composed of several elastic fluids, obeys the same laws to which they are individually subject, namely, its elasticity and density at a given temperature

are proportional to the pressure which it sustains, and for every degree of the centigrade thermometer under a given pressure it expands $\frac{1}{266}$ of its volume at the temperature zero. Hence if its density be represented by δ and its temperature by t (in centigrade degrees), its elastic force will be proportional to $(1+\alpha t).\delta$ (where α represents the decimal ·00375) as well as the pressure sustained. Lastly, the pressure is equal to the weight of a vertical column of atmosphere, having the portion pressed on as a base, and extending upwards to its extreme limit.

According to Dalton's views, the various constituent gases constituting the air are not chemically combined by the law of definite proportions, but only mechanically mixed, co-existing in the same space, and producing by the sum of their independent pressures the elevation of the mercury in the barometric tube: an ingenious theory, which however appears open to objections from the known laws of the specific gravities of fluids.

We have seen that heat increases the elastic power of air, and hence the equilibrium of a mass of air unequally heated is constantly disturbed. The currents of warm and cold air change places, the cold air moving to the warm region, and thence, when warmed, repeating the course of the previous warm air. Thus the atmosphere is a great agent in *tending* to equalise the mean temperatures of climates in various latitudes. Besides, the aërial currents are vehicles for the transfer of clouds, for producing electrical discharges, for clearing away malaria, and are turned by the ingenuity of man to promote his industry and extend his knowledge of the globe which he inhabits.

The atmosphere, considered as a transparent medium, has also great effects on light by its refractive power, and the reflection of the aqueous masses it contains. Hence arises twilight, which mitigates the transition of day to night, and from the duration of which it is easy for the astronomer to compute that altitude of the atmosphere at which it ceases to act sensibly on light, either from its total absence or extreme tenuity. This altitude is from forty to fifty miles above the level of the sea. Again, by the refractive power of the atmosphere distant terrestrial objects are elevated to the view when the spherical curvature of the earth would otherwise have caused their concealment; various optical illusions, as the mirage, fata morgana, &c., are all easily explained from the same refractive power under peculiar circumstances of temperature. By this medium sound is conveyed and odours are disseminated; the clouds which float in it soften the direct glare of the solar beams, and its aqueous particles, fluid or frozen, produce the beautiful phenomena of halos, rainbows, false suns, &c. Its greater specific gravity elevates the balloon, by means of which the nature of the upper strata of the air may be ascertained, and the barometric elevation and temperature observed, which furnish data for calculating the physical limits of the atmosphere.

With regard to the extent of the atmosphere, we may consider it under two points of view: first, the extreme limits to which it is possible for it to extend, considered mathematically as a mass rotating round the terrestrial axis in the same time; secondly, the much narrower physical limits founded on its nature as an elastic fluid, and having regard to the great diminution of temperature at high altitudes.

Any particle of the revolving atmosphere is acted on by two forces, namely, gravity, which is directed nearly to the centre of the earth, and the centrifugal force produced by rotation, which is directed according to the line by which that point is orthographically projected on the earth's axis, and tends directly from that axis. The former force varies inversely as the square of the distance from the earth's centre; the latter, directly as its perpendicular distance from the earth's axis. At any point taken in the external surface of the atmosphere, the resultant arising from both forces must be normal to that surface, in order that its form may be permanent. At the terrestrial equator the ratio of these two forces is known; as we ascend in the atmosphere along an equatorial radius produced, gravity diminishes and centrifugal force increases, both in this instance being directly opposite: hence it is easy to calculate the distance of a point in that radius where the two forces are exactly equal. Beyond that point the centrifugal force predominates, and no particle there situated could remain attached to our atmosphere, revolving with the earth both in its diurnal and orbital motions.

The above point therefore defines the extreme limit to which it is *possible* for our atmosphere to extend, and which is at a distance of about 25,000 miles from the centre, though it by no means follows that it must extend so far. Other data would be necessary to give the actual extent; for instance, the height of the barometer at the surface of the sea, and the law of the diminution of temperature in the upper strata of the air. The figure of the extreme surface can however be determined from these considerations, which is that of an oblate spheroid flattened at the poles, and in which the polar axis is to the equatorial in the ratio of 2 to 3.

As the phenomenon of twilight indicates an extreme degree of rarefaction in the atmosphere at an inconsiderable altitude above the earth's surface, we shall now consider some of the physical causes which demonstrate that the actual limits of that fluid are much more contracted than the extreme possible limits given above.

Representing by p, δ, and t respectively, the pressure, density, and temperature of the air at the surface of the earth, and by p', δ', and t', like quantities for a portion of air at a certain elevation, it follows from the general laws of gaseous bodies that $\frac{p'}{p}=\frac{(1+\beta t')\,\delta'}{(1+\beta t)\,\delta}$, where β represents the fraction $\frac{3}{800}$. Now the pressure measures the elastic force of the aërial particles: this elasticity cannot become negative, and ceases to exist when $p'=0$, which may happen either because $(1+\beta t')=0$, or $\delta'=0$. This last supposition would bring us to the consideration of the mathematical limits above treated on; the former, to the physical limits depending on the decrease of temperature at high altitudes: hence the air ceases to be an elastic fluid when $t'=-\frac{1}{\beta}=-\frac{800}{3}=-266\frac{2}{3}°$ centigrade. Now the law of the decrement of heat in the atmosphere proceeds in a progression quicker than an arithmetical, and as the plane of perpetual snow is at a comparatively small altitude in climates of mean temperature, it is easy to see that from 100 to 200 miles altitude would be sufficient to diminish the temperature to the above number of 266° below zero. Even if the simple law $p=(1+\beta t)\,\delta$ was not strictly rigorous at such low temperatures as $-266°$ centigrade, still a diminution of temperature for a given density would produce a diminution of elasticity, and scarcely interfere with the general conclusion arrived at from that law.

But even limits thus obtained would, in all probability, be still too extensive, for it is not necessary that the elasticity should be totally destroyed: it is sufficient that the repulsive power of two contiguous particles of air at that altitude shall be less than the force of gravity, and if these two forces are equal, it will be the extreme extent at which the air can remain attached to the globe, leaving out of consideration the centrifugal force, which at that altitude is inconsiderable, and which would itself tend to remove those particles. Hence the limits become still more contracted by this consideration, and it will not be necessary that the temperature should be as low as $-266°$.

Some have imagined that planetary atmospheres are due to the attraction of the masses of the planets on a rare elastic fluid disseminated through space, but this supposition will not bear investigation; for putting aside the consideration of the extreme cold of the planetary spaces, this hypothesis is not corroborated by the dimensions of the atmospheres of the sun and planets, which would then depend on their masses, and the present total disappearance of the satellites of Jupiter behind their primary would be converted into an annular appearance round his body at the time of the eclipse of a satellite.

We have seen that the unequal distribution of heat in the atmosphere is a main source of the velocities and directions of winds, and consequently of the distribution of climate; but on the other hand, the earth itself, having its own distribution of heat, reacts on the atmosphere and produces dew, hoar-frost, &c. In like manner the sea and the Polar fields of ice materially affect the general distribution of heat.

The general causes of the temperature of the globe are the proper heat of the earth and the radiation of the sun; their effects however are greatly modified by various local circumstances, such as the vicinity of seas or mountains, and the radiating power of the soil, together with the con-

ducting powers of the strata subjacent to the particular places, with other causes less permanent.

With respect to the proper heat of the earth, we observe in any latitude that at a depth which is small compared with the radius of the globe, the temperature is permanent throughout the year, the effects of solar radiation being confined to a superficial stratum of inconsiderable thickness. This fact has been fully established by long continued observations in the cellars of the Observatory at Paris, and by observations in the mines of Cornwall, in Scotland and other countries. If this stratum be supposed to be stripped off, the internal nucleus may be considered as nearly a spherical mass, arrived at a permanent state of temperature in each part, and subject at its external surface to a given distribution of heat, or to a given power of exterior conductibility. The depth at which this permanence of temperature occurs is different in different latitudes, inasmuch as the solar action on the superior stratum is also different on account of the greater or less obliquity of its rays, and likewise on account of the earth's elliptic annual motion. Thus we have the following observed relations between the permanent temperatures and the corresponding latitudes:—

	Lat.	Permanent temperatures
Equator	0°	78°
Cairo	30°.2	72°.50
Paris	48°.50	53°.60
Berlin	52°.40	49°.28
Vadso	70°	36°.

The analytical equation for the propagation of heat in solids of any form, is—

$$\frac{dv}{dt} = \mathrm{K}\left\{\frac{d^2v}{dx^2} + \frac{d^2v}{dy^2} + \frac{d^2v}{dz^2}\right\},$$

where v represents the temperature at a point of which the rectangular co-ordinates are x, y, z, and the constant K depends on the interior conducting power, and t is the time. In the case of a sphere with a radius R, we may place the origin of co-ordinates at the centre, and transforming the above from rectangular to polar co-ordinates (viz. r, the distance from the centre, θ the angle formed by the radius vector with an axis, and ϕ the inclination of the plane of θ to one of the co-ordinate planes, the angles necessarily disappear from the transformed equation, and) it becomes

$$\frac{dv}{dt} = \mathrm{K}\left\{\frac{d^2v}{dr^2} + \frac{2}{r}\cdot\frac{dv}{dr}\right\},$$

on the supposition that the exterior permanent temperatures were uniform; to which we must annex the following equation for the surface, $\frac{dv}{dr} + h\,(v - a) = 0$, where a represents the temperature of the medium in contact with the globe, and h the index of exterior conductibility of the globe. But in the case of the earth both K and h are variable, and the former must then be brought under the sign of differentiation. After there shall have been a greater number of observations on the permanent interior temperatures of the earth, the above equations will be very useful in enabling us to calculate the temperatures at depths under the surface greater than it is probable man can ever penetrate, and they will assist in the explanation of the numerous phenomena which depend on the internal heat of various parts of the globe, as volcanoes, thermal springs, &c. Regarding the interior parts which are sufficiently remote from the surface as in a state of permanent temperature, we should have $\frac{dv}{dt} = 0$; when the preceding equations admit of easy integration on the supposition that K is constant, and of approximate solutions on a probable form of the function K when variable.

With respect to the heat of the external stratum, it is principally dependent on the radiation of the sun, the effect of which depends on the duration and the obliquity of the solar rays, both of which are dependent on the declination of the sun and the latitude of the place. The integral taken throughout the year depends therefore solely on the latitude: from this integral the calculated mean temperature is derived, but differs in most cases from the observed inasmuch as the propagation of heat in the sea and in the air affects unequally those places in the same parallel which are near to or distant from the coasts, and the unequal quantity of continent in the northern and southern hemispheres produces a similar result with respect to them.

The direct heat of the sun being unequally distributed over different parts of the globe is the primary cause of the variation of climate; the effect of its rays is felt to a considerable depth in the sea, but its diurnal action on land is sensible only for a few inches in depth; the annual action however extends throughout the superior stratum of variable temperature above mentioned. The mean temperature of a place is generally estimated by taking the average of the diurnal temperatures during the four seasons of the year, and again taking the average of these four averages.

As there is a great variety of temperature in the same parallel of latitude, we cannot have a formula dependent only on this element to express the heat of places on continents, but in the sea there is much greater uniformity in this respect. The first approximate formula to that effect which deserves the name, is that given by Mayer, the celebrated astronomer; though empirical, it is found to possess considerable exactness. If t be the mean temperature in degrees of Fahrenheit's thermometer, he makes $t = 84 - 52 \sin^2 \mathrm{L}$, where L is the latitude of the place. The supposed facts which evidently suggested this formula were the equatorial mean temperature of 84°, which is now generally supposed to be too high; the Polar mean temperature of 32°, or the freezing point, which, from the recent observations of Parry, Scoresby, &c., is now known to be far too great; and thirdly, that the diminution of heat from the equator to the poles must proceed according to some even power of the latitude in order to amount to the same quantity in equal latitudes north and south, for which reason he chose the least even positive power of the sine. However, since the quantity of land in the northern hemisphere is about three times as great as in the southern, the solar heat accumulates more in the former, and in the latter is more equable between winter and summer. Dr. Brewster has substituted for Mayer's the formula $t = 81°\cdot50 \cos \mathrm{L}$, which bears an exceedingly good comparison with observations, but for the reasons above given he has found it necessary to modify it for the New World. Mr. Atkinson has shown that the mean of the errors of Mayer's and Brewster's formulæ for ten places nearly on the level of the sea are respectively $+ 1°\cdot72$ and $- \cdot12$. The temperatures of April and October are generally nearly the mean of the year, which also is found to vary but little in a considerable succession of years. If T be the mean temperature at an altitude h in feet, in a given place where t is the temperature of the surface, to express T, Mr. Atkinson has proposed the formula

$$\mathrm{T} = t - \frac{h}{251 + \frac{h}{200}},$$

giving for the extreme asmospheric cold the temperature − 200°, which is probably near the truth.

The names of Isotheral, Isocheimal, and Isothermal lines have been given to lines passing through places which have equal mean summer, winter, or annual temperatures, the two former having contrary courses, and the third intermediate. The difference of latitude between places in the New and Old Worlds, on the same isothermal line, is considerable, as appears from the following table:—

Isothermal line of Temperature.	Places.	Latitude.	Longitude.
32°	Near Ulco, Lapland,	67°	20° E.
	and		
	Table Bay, Labrador	54°	58° W.
41°	Stockholm	60°	18° E.
	and		
	St. George's Bay, Newfoundland	48°	59° W.
50°	Belgium	51°	2° E.
	and		
	Boston, U. S.	42½°	71° W.
59°	Near Rome	43°	11⅔° E.
	and		
	Raleigh, N. Carolina	36°	76⅔° W.

or we may average according to latitude thus:—

Latitude.	Mean Temperature of West of Old World.	Mean Temperature of East of New World.
30°	70·52	66·92
40°	63·14	54·50
50°	50·90	37·94
60°	40·64	23·72

The mean temperature in the latitude of 34° in different continents, and at places near the sea, is found to vary but little, thus:—

Places.	Continents.	Latitudes.	Temperature.
Cape of Good Hope	Africa	33° 51′	66°·7
Port Jackson, N. Holland	Australia	33° 53′	66°·9
City of Buenos Ayres	America	34° 36′	67°·5

The sea varies in temperature much less than the air; the region of warmest water extends about 5½° on each side of the equator, but rather farther to the south than to the north; there appear to be two points of greatest cold near the North pole, attributable to the different propagation of heat in the New and Old Worlds above remarked. Dr. Brewster supposes them to be about 80° of lat., and situated in 95° E. and 100° W. long.; the temperature at these points appears to be decidedly below zero of Fahrenheit.

The production of winds in the atmosphere, we have already stated, is mainly attributable to the unequal distribution of heat in the atmosphere. The attractive action of the sun and moon on that fluid, though producing atmospheric tides, which have been recognised by barometrical observations, could only produce a tropical wind with a velocity of 4 miles per day, which would be evidently inappreciable amongst the numerous disturbances arising from temperature; but the heating action of the sun in tropical climates produces some well-known winds in the following manner.

On account of the annual accumulation of heat from the solar rays between the tropics, two currents of air from the north and south rush forward to occupy the place of the rarefied air of this region. Now since the earth in its diurnal rotation moves from west to east, these currents appear to deflect to the west on account of the increased velocity of the parallels of latitude near the equator, which have greater radii than the arctic parallels, the apparent excess of motion towards the west being the excess of the space described in rotation by the equinoctial above that described by the tropical and even polar circles; the velocities perpendicular to the equator, being nearly equal and contrary, produce no sensible wind, but those parallel to it produce a wind directly west and enduring, called the 'trade-wind,' with this exception, that the northern hemisphere being the warmer, the resultant is a few degrees north of the equator, crossing the Atlantic from Africa to Brazil, and the Pacific from Panama to the Philippine Isles, and the Indian seas from Sumatra to Zanguebar. But when the continents stretch into the torrid zone, the local accumulation of heat being great, two opposite periodical winds, known by the name of *monsoons*, are produced, approaching the north tropic in summer, and the south in winter, and blowing in the Arabian and Indian seas north-west from April to October, and in the contrary direction during the rest of the year: the reverse occurs south of the equator.

Now as the cold air rushes into the tropical regions, expelling the warm air of that locality between 28° on each side, the latter forms a countercurrent, still possessing equatorial velocity, and produces in both hemispheres exceeding the above latitude a westerly and genial breeze, which is felt during three-quarters of the year from Newfoundland to the west of England, and from South America to the Cape of Good Hope. On the same principle the easterly, or rather north-easterly winds originate in the polar currents, and are piercingly cold in general. The great radiation of arid plains produces many local winds, such as the sirocco from Africa to Italy, and the destructive simoom of Arabia, &c., but they do not depend on general atmospheric causes.

The meteors so frequently visible in summer and in frosty weather have not yet received a satisfactory explanation, that most generally received being the existence of inflammable gases in the atmosphere: this undoubtedly is the case in the *ignis fatuus*, which, as the writer has witnessed, will change the direction of its motion by the slight current of air produced by a person walking towards it; but we are not yet able to test with great accuracy the gaseous matters which may occupy the higher regions of the atmosphere. The asteroids of November, so well described by Sir W. Herschel, have in all probability an origin independent of the atmosphere, from the regularity of their appearance about the 18th of that month, but having now become subjects of curiosity and very general observation, we may hope ere long to learn something more precise of their nature, and to take another opportunity of noticing them more at length.

Among subjects connected with meteorology which are treated in separate articles, we may notice CLOUD, DEW, AEROLITE, AIR, BAROMETER, THERMOMETER, HYGROMETER, MIST, &c., to which articles the reader is referred.

METHODISM, a very memorable word in the English vocabulary, as the thing signified is also very memorable in the history of the Christian church, and especially of that part of it which consists of inhabitants of the British Isles.

The people of England have been described by foreign writers as being beyond all other nations *religiosissimi*, or very strongly devoted to religious thoughts and exercises. The success of Christianity on its introduction into this island is one proof of it; but still more is the great encouragement given to the religious orders and the multitude of churches which were erected in the very earliest periods. A few centuries later, we have the proof which is afforded by the great encouragement which the different orders of friars received, who were a species of Methodist preachers of the middle ages. Again, when the system of Christian instruction and edification as settled by authority was in complete operation, there were for ever arising large and powerful bodies of people who pressed for something more exciting, greater freedom, greater holiness, or greater labour in the ministers, each distinguished by its own peculiarities, but all exhibiting that part of the national character to which we have adverted, the being *religiosissimi*, being men deeply impressed with the important truths of religion, and earnest in the desire to please God, and make their own calling and election sure.

Each century seems to have had its schism arising in this national characteristic. In the fifteenth there were the *Lollards*, who were easily put down by the Church; in the sixteenth, the *Gospellers*, who, having the court with them, brought about the Reformation: in the seventeenth, the *Puritans*, who were for a short time triumphant, but who were finally reduced to the several denominations of dissenters still existing, the *Presbyterian*, the *Independent*, the *Baptist*, and the *Quakers*. In the eighteenth century, when not only the Church but the several dissenting bodies were thought by many to have lost much of the spirit and fervour of religion, there arose the *Methodists*, who, being allowed to proceed unmolested, have produced, without having attempted to overturn the Church, no small change in it, in modifying its ministrations, in calling back attention to the supposed doctrines of its founders, and in rousing its ministers to more strenuous exertions.

Methodism then designates the great English schism of the eighteenth century differing little in essence from the Puritanism of the century before. In both cases it was the desire of services of a more exciting character than were presented by ministers such as then were the ministers of the Christian religion in England, and the desire of a greater admixture of doctrinal matter in the instruction which was delivered from the pulpit. *Evangelicalism* is a kind of form of Methodism, but is perhaps sufficiently distinguished from it to be regarded as the manifestation of the extreme of religious feeling in the nineteenth century. The chief difference between Puritanism and Methodism lies in this: that the Puritans had within their body a much larger proportion of persons of rank and opulence, and that they never contemplated the attainment of their object by the introduction of an illiterate ministry. In the Methodists of the last century were found not many great, not many noble, and the instruments of the propagation of Methodism were, with very few exceptions, persons taken from the lower classes of society, men without learning or attainment, and supposed to be qualified for the work chiefly by possessing qualities which are indeed truly valuable in a Christian teacher, zeal for the promotion of holiness and virtue, and a familiarity with the letter of the Word of God. The Huntingdon family, in the female portions of it, took it under their patronage, and there were two or three other ladies of rank who attached themselves to the Countess of Huntingdon, and encouraged the labours of the Methodist preachers. But it was not till the present century that Methodism, if we may regard it as identical with Evangelicalism, obtained the countenance of many persons high in rank. This change is chiefly to be attributed to two persons, the late Mr. Wilberforce and the late Mrs. Hannah More, who were Methodists in one sense of the term, but not in the other and more common sense of it; that is, they continued in the Church pleading for greater strictness of life and greater zeal in the ministry, more energetic preaching of what they regarded the distinguishing doctrines of the gospel, and more assiduous labour in the clergy; but not, like Lady

Huntingdon, forming societies and placing pastors over them, who were to be dissenters, and not comprehended in any way within the pale of the Established Church.

It is interesting to observe the various forms in which Methodism is presented. We see it in the Church of England in the character of those ministers and congregations which are called Evangelical; we see it in a large body of dissenters now calling themselves Independent or Congregational; and we see it more strikingly in the various sects which are called the Methodist sects, and which are in fact so many different classes of persons who collectively are called Methodists. There are:—1, the Wesleyan Methodists; 2, the Methodists of Lady Huntingdon's Connection; 3, the Methodists of the New Connection; 4, the Primitive Methodists; 5, the Bible Christians; 6, Protestant Methodists; 7, Association Methodists; 8, the Inghamites. There is also a large body of persons, chiefly in Wales, calling themselves Calvinistic Methodists, who are not included in what is called Lady Huntingdon's Connection.

The year 1729 is considered as the time at which Methodism begun. John Wesley, who is universally considered as the founder, was at that time residing at Oxford, being a member of that university. A brother, whose name was Charles, was residing at Oxford at the same time, and there were a few other young men who, like them, were intended for the ministry in the Church, who formed a little association for their common spiritual and religious improvement. They were soon remarked for a greater strictness of life and for wearing more of the form of religion than was then usual at Oxford. It is said that these persons very soon got the name of Methodists, arising out of a casual observation of a member of Merton College, who said, 'Here's a new sect of Methodists sprung up;' but to what set of persons in ecclesiastical or other history he referred is not quite settled. The name, it is manifest, is a very absurd one.

The Wesleys were sons of a country clergyman who resided on his living at Epworth in Lincolnshire, a part of the kingdom where at that time the inhabitants were singularly rude and uninformed. It has not been remarked by the writers of the life of Wesley that his father was educated for the ministry among the dissenters, but conformed to the Church early in life. It is not intended in this article to give a biographical notice of the founder of Methodism. This will be given in its more appropriate place. [Wesley.] Under the word Whitefield will also be found a notice of George Whitefield, another student at Oxford, who joined the Wesleys in 1732, and who had a large share with them in laying the foundation of Methodism. It may suffice for the present to say that the Wesleys and Whitefield, instead of following the usual course of clergymen, in settling down on livings, after studying in the university, undertook the wider duty of rousing their countrymen generally to a higher tone of devotional feeling, and to a regard to the doctrines of the Church, to which there was then, owing in a great measure to the writings of such men as the Latitudinarian divines originally, and, after them, of Locke, Addison, Burnet, Hoadly, Clarke, Whiston, Peirce, and others, a growing indifference: men were beginning to think that the all-in-all in Christianity was the doing justly, loving mercy, and walking humbly, looking for that blessed hope and glorious appearing of our Lord and Saviour Jesus Christ, when every man should receive according to his works. Wesley went forth proclaiming that he came to call men back to *old Church of England principles*. This was his favourite phrase, as appears by many passages in his journals, and this object (at first, at least) was what he himself considered the chief purpose of his mission. What he meant was original sin, regeneration, the atonement by the blood of Christ, the influence of the Spirit, justification by faith, freedom of the will, accountability, and eternal reward or suffering; Whitefield added to these the eternal decrees, the extreme doctrines of Calvinism.

The object of neither of them was to be founders of sects out of the Church, but to produce a change within the Church. It was soon however manifest that their end could not be attained by remaining, even outwardly, conformable to the rules of the Church in regard to its ministers. The doors of the parish churches were soon closed against them, and the meeting-houses of the dissenters were closed likewise. They then preached wherever a congregation could be gathered together, in rooms or in the open air, and preaching with the zeal and energy of Apostles, it was in vain, with a population like the English, to attempt to prevent them from making a deep impression. Such energy of preaching had not been witnessed since the time of the old Puritans. The effect indeed may be described as marvellous. The cry, 'What shall I do to be saved?' was heard from many voices wherever they had an audience; sometimes this cry was accompanied by dreadful shriekings and faintings. The accounts given by friends and enemies are in respect of this the same. Many well-meaning persons regarded it only as a mischievous enthusiasm. By the profane the preachers were not unfrequently assaulted, and their lives placed in jeopardy. But many were soon found ready to assist them in their work, either by forming into societies persons convinced by them, and erecting chapels for their assembling together, or by taking upon themselves the office of preacher, and following in the track which their masters had trod. There were at the same time a few persons who were ministers in the Church, and who did not leave the parishes in which they were settled, who seconded the labours of these men. Such were Fletcher, Sellon, Perronett, Dickinson, Venn, Grimshaw, and others.

Whitefield died early, worn out by his extraordinary exertion. He was the founder of the Calvinistic section of Methodists. But the life of Wesley was prolonged to his eighty-seventh year; and when he died, which was in March, 1791, he had been sixty-five years in the ministry, and fifty-two years an itinerant preacher; he lived also to see in Great Britain and Ireland about three hundred itinerant preachers and a thousand of what are called local preachers 'raised up from the midst of his own people,' and eighty thousand persons in the societies under his care.

Such was the state of this one principal branch of Methodism at the time of Wesley's decease. Some thought that as it had grown with him, it would die with him; but they were mistaken. He had provided (as far as human means go) for its perpetuity by binding up his members in a church, with a frame and constitution as strong as could be given to it by subordination, authority, rules, common interest, and the bond of common property. Thoroughly regardless of accumulating personal wealth, the contributions of the members of his societies, which had long far exceeded the expenses, enabled him to transfer to the body of preachers, in whom, as in an assembly of presbyters, he vested it, whatever interest he had in a multitude of chapels in every part of England, and a large surplus fund; and this property, it is understood, has gone on year by year constantly increasing, notwithstanding the vast exertions which have been made in the erection of chapels, schools, and other buildings, the support of an additional number of preachers, and in missionary exertions among the people not yet Christianized.

It was in the year 1740 that the first Methodist society was formed. It met at a chapel in Moorfields, and it was in 1743 that the rules, which still continue in force, were drawn up for this and other societies, especially those of Bristol and Kingswood, the part of the kingdom in which, at the beginning of his ministry, Wesley had chiefly laboured These rules set forth, that the Methodists are a people who, in addition to the form of Christianity, seek the power of godliness, and manifest it by good works: the societies are united, that by counsel, exhortation, and prayer, they may assist each other in the great work of religion.

We have next to describe the constitution of these societies and of the general union of them, forming the highly important class of Christians called the Wesleyan Methodists.

These societies are divided into classes of ten, twenty, or more persons, and he that is supposed the best qualified by mental and religious excellency, is appointed the leader. His duty is to see his members weekly, to receive the voluntary contributions of his class, and to take the amount to what is termed the 'leader's meeting,' that is, the stated meetings of all the leaders and the society stewards in a certain locality, where the society of the place is repre sented, and its affairs transacted. The society stewards take the monies from the leaders, pay the ministers their weekly stipend, and take the surplus to the circuit stewards at the quarterly meeting. In the leaders' meetings are stewards for the poor also, who at the direction of the meeting give to the leaders, for their poorer members, whatever funds may be furnished by any society and congregation for that purpose.

A number of these united societies lying around some cen

tral town or large chapel is known as a circuit. The villages or chapels in the vicinity of the centre are regularly visited by the ministers at stated times for the purpose of conducting worship, and the discharge of other pastoral duties. In the origin of Methodism these circuits included not merely one county, but sometimes parts of several; but now, owing to the spread of Methodism, the circuits are limited to a diameter of twenty, ten, and in some cases of fewer miles. The societies and congregations in these circuits are committed to the care of the ministers yearly appointed by the Conference; and more especially to one who is termed the superintendant; generally, when compared with his fellow-ministers in the same circuit, he is of the longest standing in the connection, but not always so, as the Conference claims the right of appointing to this office the person whom it judges the most proper. To the superintendant principally the direction of the other ministers is committed, as well as that of the local preachers also, who are men in business and only occasional preachers; and in addition to the above, the superintendant has the care of the leaders, stewards, and, in one sentence, the whole circuit: he is accountable to the Conference for the use of the power committed to him.

About the termination of every quarter, the ministers, circuit-stewards (who are two principal members in the circuit, nominated yearly by the superintendant and chosen by the quarterly meeting), society-stewards from every separate society in the circuit, and other leading friends meet, for the purpose of receiving the respective accounts of the separate societies, and the balances, if any, from the society-stewards, out of which the circuit-stewards pay the quarterly stipends of the preachers, balance all the accounts of the circuit, and determine everything within the province of the quarterly meeting, according to the Statutory Laws of Methodism, which are found in the 'Minutes of Conferences.'

A number of these circuits, as for example the collective number in any county, are united and known as a district. The Conference appoints one of the ministers therein, by ballot, as the chairman; to whose care its Methodistical direction is chiefly committed. In the month of September in every year the superintendants of the circuits in the district, and the circuit-stewards of every circuit, are called together in some central or convenient town, to arrange prospectively the financial affairs of every circuit therein, for the coming Methodistic year; that is to say, the probable amount that the connectional collections will be able to allow to every needy circuit, so that means may be taken to supply from its own resources whatever may be deficient.

In the month of May, the district, as above, is again assembled; the ministers alone the first day, to examine the moral character, Methodistical orthodoxy, and obedience of every minister therein; afterwards, in the presence of the circuit-stewards, they wind up the financial affairs of the circuit for the Methodistic year, which in May has nearly expired. The result is carefully recorded in minutes, which are authoritatively required from every chairman of every district-meeting at the next Conference.

At the May district-meeting, when the circuit-stewards have taken their departure, one of its ministers is chosen by ballot, as its general representative at the coming Conference. Then the meeting determines how many additional ministers belonging to the district shall be allowed to proceed to the Conference. The Conference, strictly and truly, consists only of one hundred preachers, whose names are in the deed that gives it a legal existence, but all the preachers allowed to go from the respective districts are suffered to sit therein, and vote as integral parts thereof. At the assembling of the Conference, one of its first acts is the choosing by ballot the president and secretary, who must be of the hundred, the legal Conference. The business which follows comprises the supplying of the places of those who by death, &c., have been removed, by the hundred, partly by ballot and partly by nomination; the examination of the character of every minister as to his moral conduct, Methodistical orthodoxy, &c.; the examination of the minutes of the several districts; the appointments of the ministers for the coming year. Further, they legislate for and determine the multifarious concerns of the connection.

In Methodism, the members are divided into two great classes, the ministers and the people; and each, if accused, is tried at its separate tribunal, and by its own peers. The members are tried by the leaders' meeting; and the ministers by the ministers only, at a district-meeting. If either the members or ministers are dissatisfied with the decision of their respective judicatories, they may appeal to the Conference the highest court of Methodism.

Methodism furnishes its ministers from the members, who first are known as local preachers, and then nominated at the March quarterly meeting as persons proper to be recommended for examination at the coming May district-meeting by the ministers alone. If the churches in the circuit, by their representatives at the quarterly meeting, recommend the person nominated, he appears before the district-meeting and undergoes an examination as to his personal acquaintance with Christianity, his Methodistic orthodoxy, and attachment to its discipline. If approved and recommended by the district-meeting, his name is brought before the next Conference. If all inquiries here are satisfactorily met, he is either immediately employed as a probationer, in which state he must continue for four years, before he can be admitted into full connection, that is, be ordained and permitted to administer the sacraments, or he may be placed on the list of reserve, and if approved, when again examined by the preachers in the London district, he will be admitted to the Theological Institution, and by training for some two or three years, be prepared for his work.

The doctrinal test of the Methodists is found in certain volumes of Mr. Wesley's Sermons, and his notes on the New Testament. Among the most prominent of these doctrines, next to the being of God, his perfections, and worship, are—original sin, moral impotency, the sufficiency of grace, the atonement, general redemption, justification by faith, the witness and work of the Spirit, entire regeneration, good works as the fruits thereof, eternal life, and everlasting punishment.

The disciplinary test is found in the minutes of Conferences, the statute-books of the Wesleyans. While the ministers appointed by the Conference keep within the above limits, they have a right to the pulpits, and are beyond control. But any departure from the above will give authority to the trustees of any chapel in which un-Methodistical doctrine is preached, to require the chairman of that district to summon the ministers of the district, and the trustees of the circuit in which the supposed transgressor is found, and if at the district meeting so constituted his delinquency is proved, he may be suspended until the next Conference, when the whole case will be reviewed, and finally adjudicated.

While the ministers are irreproachable, the Conference claims the right of appointing them to all the chapels in the connection settled on the Conference plan, and this right is beyond dispute or control; but over the property of the chapels the Conference has no control, except it be the giving or withholding permission to the trustees to sell, when this is craved by them.

The labours of Wesley had not been wholly confined to England. He had made little impression upon Scotland, where the number of members at the time of his decease scarcely exceeded a thousand. But in Ireland he had about fifteen thousand, and in the United States there were about thirty thousand. Since his decease, the prevalence of Wesleyan Methodism in North America has been very great, the number of members reported at the Conference of 1838 being 658,574 under the care of the American conference; and 14,000 under the care of the Wesleyan Methodist church in Upper Canada.

The following table will show the progress made by them in England:—

Year.	Circuits.	Preachers.	Supernumeraries.	Members.
1767	27	76	1	22,642
1777	43	118	—	32,290
1787	69	176	10	49,946
1797	106	272	9	81,451
1807	170	431	37	117,054
1817	297	644	48	190,323
1827	331	715	77	233,581

The number of Scotch members, in 1827, was 3658. In 1838 the number of members in Great Britain was 296,801, which is not half the number reckoned in the United States of America.

The Wesleyan Methodists have established foreign missions at Stockholm; in Germany, France, Gibraltar, and Malta; in Hindustan and Ceylon; in New South Wales, Van Diemen's Land, Newfoundland, and the Friendly Islands; in Africa, in the West Indies, and in British North America. The number of persons reported to the last Con-

ference (1838) as under the care of their foreign missionaries in their various stations was 66,808.

This is to be regarded as the state of only one branch of Methodism, a principal branch undoubtedly, or rather the main branch, but there are the several branches besides of which we have already spoken, each with chapels, preachers, and numerous members, and most of them having some special missionary service for the extension of the knowledge of Christ's Holy Gospel.

Some of them have separated from the main body of Methodists since the death of Mr. Wesley. The respect paid to him has not been so generally transferred to the hundred ministers, in whom he vested the power of managing the affairs of his community, as he probably wished and expected.

In 1793 great dissensions existed about the sacraments, whether they should or should not be administered by the ministers, in the chapels, to the members of the society who required them as a part of Christianity. This led to secessions at Bristol and elsewhere. In 1795 many influential societies chose delegates, and sent them to the Conference then held at Manchester, for the purpose of claiming some share in the government of Methodism. This led to concessions as they may be found in the Plan of Pacification,—the Bill of Rights of the Methodists.

With these concessions many were not satisfied, and, being led principally by the Rev. Alexander Kilham, they seceded and formed the New Connection, a truly respectable body. Mr. Bryant, of the North Cornwall district, was the founder of the Bible Christian Methodists. The Primitive Methodists, who are sometimes known as Ranters, originated in Staffordshire: their professed object is to recall the Wesleyans to the antient spirit and fervor with which their fathers met rude and uncivilised mobs. Dissension in Leeds some ten years since gave birth to the Protestant Methodists, who declared that the Wesleyans had violated their own laws by the erection of an organ in one of the chapels in that town, contrary to the decision of a leaders' meeting. Some four years since, the establishment of the Theological Institution, the expulsion of Dr. Samuel Warren, and contentions on the rights of leaders' meetings, gave existence to the Association Methodists. These are the leading offshoots from the Wesleyan body.

The reader who wishes to see how Methodism appears to a person of an acute and discerning mind, who is not of the body, may consult the 'Life of Wesley,' by Robert Southey, a work in which there is much profound reflection. The work has however found little favour in the eyes of the Methodists themselves; and one of their ministers, the Rev. Richard Watson, has published Observations upon it, in which Dr. Southey is rather severely handled. Other Lives of Wesley there are by Hampson, by Dr. Coke, Dr. Whitehead, Henry Moore, and by the same Mr. Watson. Dr. Adam Clark's 'Memoirs of the Wesley family' is but a poor and tasteless performance. We may mention also a little volume entitled 'A Miniature of Methodism, or a Brief Account of the History, Doctrines, Discipline, and Character of the Methodists,' by Valentine Ward, of which the sixth edition was published in 1834. There is also 'The Portraiture of Methodism,' by Joseph Nightingale, and many histories of the rise and progress of Methodism in particular districts. Those who wish thoroughly to understand Methodism in its genius and true character, to see its defects and its excellences, the difficulties with which it had to contend, and the means by which it triumphed, would do well to read the 'Journal of John Wesley,' published by himself, a piece of autobiography worthy the attention of all, but especially of the philosophic observer of the actions of mankind when under the influence of strong religious excitement, or of an individual, when under a sense of duty, or by whatever impulse, he emancipates himself from those restraints which society has endeavoured to impose (though such endeavours are but vain) upon private judgment in affairs relating to religion, and private religious thought and action.

METHO'DIUS and CYRILLUS, two brothers, the apostles of Christianity among the Slavonians in the eighth century, and the inventors of the Slavonian alphabet, were natives of Salonica or Thessalonica in Greece. Methodius held a high command in the Greek army under the emperor Michael III. Constantine, or according to the monastic name he afterwards assumed, Cyrillus, who had been educated at the court of Constantinople, was in holy orders, and was keeper of the library of Santa Sophia. He was first sent by the emperor as a missionary to convert the Saracens inhabiting the banks of the Euphrates; and about the year 863 he and his brother Methodius proceeded on a religious mission to the Slavonians, at the request of the princes Rotislav, Swiatopolk, and Kozel, who had made application to the court of Constantinople for instructors in the Christian faith. The choice both of the emperor and the clergy fell upon Methodius and Cyrillus, the first being selected on account of his knowledge of the Slavonian, and the other because he was well skilled in many Oriental languages. Whether both brothers had a share in the formation of the Slavonian alphabet is doubtful, some writers attributing it to both of them, others to only one, and of these latter some to Methodius, others again to Cyrillus. They translated the Psalter, the Gospels, and many other parts of the Scriptures into Slavonic. Cyrillus however did not continue there above four years and a half, after which he visited Bulgaria, and next proceeded to Rome, where he died, according to Schlozer in 871; according to others, in 873. Methodius, on the contrary, remained, and continued his labours for about thirty years, in the course of which time he is said to have translated all the Scriptures. None of the original manuscripts are extant, but it is supposed that the Slavonic version adopted by the Greek church is derived immediately from that of Methodius and Cyrillus.

METHO'NE, MODON. [MESSENIA.]

ME'TIUS, ADRIAN, was born at Alkmaar, a town of North Holland, 9th of December, 1571. His father, whose name, according to Lalande, was likewise Adrian, although Montucla calls him Peter, was a military engineer of considerable reputation. His skill contributed greatly to the successful defence of Alkmaar, when besieged by the Spaniards in 1573. It was he also, and not his son, who first gave 355 : 113 as the ratio of the circumference of the circle to its diameter.

From his father young Adrian soon acquired a practical knowledge of the mathematics, which his natural inclinations towards such pursuits enabled him greatly to improve. After studying law and medicine at the university of Franeker, he passed into Germany and Denmark, where he became a pupil of Tycho Brahé. Upon his return to Holland he assisted his father in his professional avocations, until the year 1598, when he was appointed professor of mathematics in the university of Franeker. He retained this appointment until his death, which took place at Franeker, 26th of September, 1635. A considerable part of his fortune was expended in the study of alchemy, but he either ridiculed or disregarded the speculations of astrologers. The following list of his works is given by his friend P. Winsem, in his 'Elogium Adriani Metii,' printed in the 'Memoirs of the Academy of Franeker:'—'Doctrina Sphærica,' Francq., 1598, 8vo.; 'Institutionum Astronomicarum Libri III.' Ibid., 1606, 1608, 8vo.; 'Arithmetica et Geometria Practica,' Ibid., 1611, 4to.; 'De Gemino Usu utriusque Globi, Amst., 1611, 4to.; 'Praxis nova Geometrica per usum circini et regulæ proportionalis,' Francq., 1623, 4to.; 'Calendarium perpetuum articulis Digitorum computandum,' Roterod., 1627, 8vo.; 'Astrolabium,' Francq., 1627, 4to.; 'Opera omnia Astronomica,' Amst., 1633, 4to.

(*Biographie Universelle*; Montucla, *Histoire des Mathém.*; Hutton's *Dictionary*.)

METIUS, JAMES, was a younger brother of the preceding, and the reputed inventor of the refracting telescope. On this point Montucla quotes the following passage from the 'Dioptrics' of Descartes, wherein the latter says, 'It is now about thirty years since this admirable invention was first ascribed to James Metius, a man who had never studied the mathematics, notwithstanding that both his father and brother had made them their profession. This individual, while one day amusing himself with a few burning-glasses, after looking through them singly, began to look through them by pairs, placing one at each extremity of a short tube. In this way a convex and concave lens happening to be employed together, the first refracting telescope is said to have been constructed.' (Montucla, tom. ii., p. 230.) The reputed date of this discovery is the beginning of the seventeenth century.

A somewhat similar story is related of the children of a spectacle-maker of Middelburg, in Zealand. There is however as much or more reason to suppose that the discovery took place in England, more particularly when it is remembered that the satellites of Jupiter were observed in

England by Harriot in 1610. (See the 'History of Optics,' by Mr. Barlow, in the *Encyclopædia Metropolitana*.) Weiss adds (*Biog. Univers.*) that Metius guarded his secret with such extreme caution, that, even when about to die, the priest who attended him could not induce him to divulge it; another story is that he confided the secret reluctantly to Prince Maurice, on an occasion when that prince honoured him with a visit for that especial purpose. We have not been able to find the year in which James Metius was born, or that in which he died.

METON, METONIC CYCLE. The astronomer Meton was living at Athens at the beginning of the 87th Olympiad, B.C. 432. He was, according to some, a Lacedæmonian (Λάκων), but the best authorities call him a Leuconian (Λευκονιεὺς). All we know which is worth recording here is, that the solstices which he observed with Euctemon are preserved by Ptolemy, and that he was the founder of the celebrated lunar cycle which is still preserved by the Western churches in their computation of Easter.

The Metonic cycle takes its rise as follows: 235 revolutions of the moon are very nearly 19 revolutions of the sun, and one complete revolution of the moon's node. If these approximations were exact, all the relative phenomena of the sun and moon, particularly those of eclipses, would recommence in the same order, at the end of every nineteen years. There is however an error of some hours in every cycle. [CALIPPUS; MOON; PERIOD OF REVOLUTION.]

The first year of the first Metonic period commenced with the summer solstice of the year 432 B.C.; and if the reckoning had been continuous, what is now called the *golden number* of any year would have denoted the year of the Metonic cycle, if the summer solstice had continued to be the commencement of the year. On reckoning however it will be found that A.D. 1, which is made the first year of a period of 19 years, would have been part of the fourteenth and part of the fifteenth of a Metonic cycle.

METOPE. [BASSO RILIEVO]

METO'PIA (Ornithology), Mr. Swainson's name for a subgenus of *Pipra*.

METRE (from the Greek μέτρον, *metron*) is that quality of verse by which it is to the ear distinguishable from prose. It is generally held to be one of the essentials of poetry; imaginative thought being the other. No reason can be assigned for this opinion, the truth being that it is attributable only to our nature as men, by which we feel pleasure in rhythmical arrangement of words, and consistently with which we cannot consider imaginative writing as perfect, unless couched in metre.

A distinction has been drawn between antient and modern metres, one being said to depend on quantity, the other on accent; quantity and accent being further supposed to differ in kind. A little reflection however will tend to convince us that delicacy of ear has as much to do with the difference between antient and modern metres as any fancied change from quantity into accent.

The southern nations still retain this delicacy of ear, as we know from the marked difference in Italian between the pronunciation of double and single consonants, a difference to which our language is a stranger as far as *time* is concerned. Though *we* see no distinction in time between the second syllable of the words *laborare* and *liberare*, there is no reason why the Romans should not, and with that assumption the whole difference between accent and quantity vanishes. It would be useless to enumerate the names which have been given to metres. The Greek and Roman metres differ from our own in being more numerous, and in allowing collocations of syllables (called feet) such as we could scarcely feel to be consonant with rhythm. The cause of this difference seems to lie in the form of each language.

Another grand distinction between antient and modern metres is that of rhyme, which occurs but seldom in the former, and which, until the time of Shakspere, was nearly universal in the latter. Antient and modern languages both afford specimens of the alliterative measure. It may be traced in the older Latin writers, and was the distinguishing peculiarity of the Anglo-Saxon verse. 'Piers Plouman's Visions' are the best known compositions of this kind. Those who seek for further information on the subject of English metres, particularly on peculiarities which have occasioned so much difficulty to the readers of Chaucer, will do well to consult Mr. Guest's 'History of English Metres.' Some observations by Coleridge, prefixed to 'Christabel,' are also worth attention.

METRIORHYNCHUS, Dr. Hermann von Meyer's name for a genus of fossil *Gavials*, found, according to him, in the lias, the Oxford clay, at Honfleur, and the Kimmeridge clay at Hâvre.

Example, *Metriorhynchus Geoffroyi* (H. von Meyer); 2nd, *Gavial de Honfleur*, Cuv., 'Oss. Foss.,' v., pl. 2, pp. 143 and 525; *Steneosaurus rostro-minor*, Geoff.

METRONOME (from μέτρον, *measure*, and νόμος, *a division; also, a song*), a very ingenious instrument, a pendulum, the point of supension of which is between the extremities, invented, and introduced about the year 1814, by John Maelzel (civil engineer, and mechanician to the emperor of Austria), for the purpose of determining the movement, *i.e.* the quickness or slowness of musical compositions.

Of the utility of a *time-measurer*, both to composers and performers, and for some account of its early use, see CHRONOMETER.

Of Maelzel's Metronome there are two kinds. The one is a pendulum kept in motion by a spring and wheelwork, and which ticks the vibrations:—the other is also a pendulum, as above described, but without any machinery, and acting only so long as the force of the impulse given shall last. The former, therefore, it will be obvious, is complicated and expensive; the latter is simple and cheap.

The inventor thus describes and explains the manner of using this instrument:—

'1. A sliding weight is attached to the rod (which is graduated) or steel pendulum; the higher up this weight is shifted, the slower will be the vibrations, and *vice versâ*; so that when the weight corresponds with the number 50, the vibrations will be the slowest possible; at No. 160 they will be the quickest.

'2. These numbers have all reference to a *minute of time*; *i.e.* when the weight is placed at 50, fifty beats or ticks will occur in each minute; when at 60, 60 beats, or seconds exactly, in a minute; when at 100, 100 beats in a minute, &c.; any stop-watch, therefore, will show how far the correctness of the metronome may be depended on.

'3. The doubles of the numbers of the scale answer to a precisely *double* degree of velocity. Thus, if 50 be the proper number for a minim, 100 will be the number for the crotchet *in the same movement*, &c. The numbers omitted on the scale have been found practically unnecessary.

'4. The composer is best able to judge, from the nature of his movement, whether to mark its time by minims, crotchets, quavers, &c. Generally speaking it will be found, that in *adagios* it is most convenient to mark the time on the Metronome by quavers; in *andantes* by crotchets; in *allegros* by minims, and in *prestos* by whole bars. As often however as the case may admit, it is desirable that the pendulum should be made to beat integral parts of a bar, just as a master would beat or count the time.'

Much opposition was made to the use of this excellent instrument, when first introduced; but no sensible composer or performer now entertains a doubt of the usefulness of the Metronome, or of some kind of pendulum answering the same purpose.

METRO'POLIS. [COLONY, vol. vii., p. 359.]

METZ, a city in France, capital of the department of Moselle, situated on the Moselle at the junction of the Seille; 172 miles in a direct line east by north of Paris, or 191 miles by the road through Château-Thierri, Châlons-sur-Marne, and Verdun; in 49° 6′ N. lat. and 6° 12′ E. longitude.

This city existed in the time of the Romans, to whom it was known by the name Divodurum, and was the chief town of the Mediomatrici, one of the Belgic nations. At a later date it took the name of the nation, Mediomatrici, for which, early in the fifth century, was substituted the shorter designation of Mettis or Metis, whence the modern Metz. In the civil dissensions which followed the death of Nero, A.D. 70, Divodurum was nearly destroyed by a sudden outbreak of the troops of Vitellius. (Tacit., *Histor.*, i. 63.) Divodurum was ruined in the invasion of the Huns under Attila, A.D. 452; but afterwards became the capital of Austrasia, which was sometimes termed the kingdom of Metz.

In the division of the Carlovingian empire, Metz was comprehended in the kingdom of Lotharingia or Lorraine.

[LORRAINE.] The grants of the emperors to the bishops of Metz, Toul, and Verdun, rendered those prelates feudal lords of their respective dioceses, subject only to the supremacy of the emperor; and this part of Lorraine became known in history as Les Trois Evêchés, 'the three bishoprics.' The city of Metz was however made, by the emperor Otho II., a free Imperial city, with a voice in the diet of the empire, the right of choosing its own magistrates, and of coining money. The city became exceedingly flourishing, being the centre, apparently, of a great inland trade between France and Germany; and in A.D. 1444 was enabled to resist an attack from the combined forces of Charles VII. of France, and René of Anjou, king of Sicily and duke of Lorraine. The attempts to check the progress of the Reformation appear to have occasioned some troubles at Metz; but the principles of the reformers made such progress, that A.D. 1543 they were allowed the free exercise of worship. In the troubles of the empire near the close of the reign of Charles V., Henri II. of France, with whom the German Protestant princes had formed an alliance, entered Lorraine with an army, and was admitted into Metz by the townsmen, A.D. 1552. In the same year the emperor besieged the place with 100,000 men; but the duke of Guise, who commanded the garrison, made so stout a defence, that the emperor was obliged, in Jan., 1553, to raise the siege. From this time the town remained under the protection of France, though the bishops recognised the authority of the emperors, and received their investiture from them. This arrangement lasted until 1633, when the king of France assumed the sovereignty of Les Trois Evêchés, which was confirmed to him by the treaty of Münster, or Westphalia, A.D. 1648. The siege of the town, subsequent dissensions, and the loss of its municipal freedom, caused a decay of trade and population; and at the close of the seventeenth century, the town numbered only 22,000 inhabitants.

In the division of France before the Revolution, Metz, with the rest of Les Trois Evêchés, was included in the province or military government of Lorraine.

The Moselle and the Seille are divided in and near the town into several channels, enclosing small islands, on some of which, as well as on the mainland, the town is built. Metz is a fortress of the first class. [HORN WORK.]

There are nine gates with drawbridges. The interior of the town, which is principally in the angle formed by the two rivers, is in general handsome. The streets are wide, straight, and well paved. The square called 'Quartier Coislin,' in the south part of the town, is very handsome, and the esplanade of the citadel affords a pleasant promenade. The square of St. Louis is surrounded with arcades. The houses are for the most part well built. The cathedral is a Gothic building, remarkable for the boldness and lightness of its architecture: its length is estimated at 363 feet (probably French feet, equal to about 387 English feet), and the height of the tower at 373 French, 398 English feet. There are nine other churches, four nunneries, a consistorial Protestant church, and a Jews' synagogue. The Jews had formerly a particular quarter of the town assigned to them, which is still distinguished by its dirty and narrow streets. The most remarkable of the churches are those of St. Simon, Notre Dame, and St. Vincent, the last distinguished by a portal with a triple row of columns. The town-hall, the Palais du Gouvernement, built at a great expense in the reign of Louis XVI., where the courts of law sit, the prefect's office, the theatre, a building of greater external than internal beauty (these two last-named edifices are on an island of the Moselle), the royal college or high school, the military hospital, a vast building, the arsenal, the different barracks, the building for the school and staff of the artillery, the workhouse, and the covered market, lately erected,—are among the public buildings most worthy of notice. There are twenty bridges, ten over the arms of the Moselle, and as many over those of the Seille.

The population of the town has been gradually increasing since the commencement of the eighteenth century. In 1741 it was 30,000; in 1789, 36,000; in 1800, 32,000; in 1814, 41,000; in 1831, 44,416; in 1836, 42,793. The chief branches of manufacture are woollen cloths, flannels, and stuffs, cotton yarn, leather (formerly the staple of the place, diminished by the continuance of war, but now reviving), hats, especially military hats, braid trimmings, and embroidery (in which 1200 people are employed), starch, soap, beer (which is very good), brushes, pencils, iron wares, cutlery, buttons, jewellery, clocks, paper-hangings, and confectionary. There are workshops connected with the arsenal and other military establishments. In the neighbourhood of the town are quarries of good limestone, tile-kilns, beet-root sugar-houses, and other industrial establishments. Trade is carried on by means of the Moselle, which is navigable to Nancy, many miles above Metz. High roads communicate with Luxembourg, Namur, and other places in Belgium; with Mainz and Frankfort in Germany; and with Strasbourg, Nancy, and Paris.

Metz is the seat of a bishop's see, the diocese of which comprehends the department of Moselle, and the bishop of which is a suffragan of the archbishop of Besançon. It has a Cour Royale and an Académie Universitaire, the jurisdiction of which embraces the departments of Ardennes and Moselle. Here also are the head-quarters of the third military division, including the departments of Moselle, Meurthe, and Vosges. There are a variety of other government offices, fiscal, judicial, and administrative. There are also a number of establishments connected with the military department, a royal practical school of artillery and military engineering (the finest institution of the kind in Europe), regimental schools of artillery and engineering, a central military pyrotechnic school, and a miners' school. For general or special instruction there are the faculties connected with the Académie Universitaire; a college or high school, a normal school, a society of literature, science, and art; a society for the encouragement of agriculture and of industry; a philharmonic society, free courses of instruction or schools for drawing, painting, music, and geometry and mechanics applied to the arts; public lectures on midwifery and botany, a school of trade, a society for the encouragement of elementary instruction, a departmental society for medical science, a society for the encouragement of arts and trades, maintained by the wealthier Jews (of which nation there are many at Metz) for their poorer brethren; a maternity society, and a mont de piété, or loan society; a public library of 31,000 volumes, three other libraries, a botanic garden, a departmental nursery ground, and museums of natural history and mineralogy. There is a school or schools taught by the Frères de la Doctrine Chrétienne, with a thousand pupils.

The arrondissement of Metz comprehends an area of 620 square miles: it is divided into nine cantons or districts, each under a justice of the peace, and comprehends 218 communes. Its population in 1831 was 150,840; in 1836, 150,811.

In the neighbourhood of the town are the remains of a Roman aqueduct, which conducted the waters of a stream, seven or eight miles distant, to the Naumachia, which was in the south part of the town. Seventeen arches of this aqueduct yet remain. The ruins of an amphitheatre and of a Roman palace have been also discovered.

The territory known as Le Pays Messin comprehended the territory immediately around the city, included in the diocese and jurisdiction of the bishops, to which alone the name was in strictness applicable, and the lordships scattered through Lorraine, which formed part of the temporalities of the see. The former is entirely and the latter are partly comprehended in the department of Moselle; some of the lordships are in the departments of Meurthe and Vosges.

MEUDON. [SEINE ET OISE.]

MEULAN. [SEINE ET OISE.]

MEULEN, ANTHONY FRANCIS VAN DER, born at Brussels in 1634, was a disciple of Peter Sneyers, an eminent battle-painter, under whom he improved with extraordinary rapidity. While he was pursuing his profession at Brussels, it happened that some of his works were taken to Paris, and shown to the minister Colbert, who was so pleased with them that he invited him to Paris on very honourable and advantageous conditions. His talents as a battle-painter recommended him to Louis XIV., whom he always accompanied in his campaigns. He designed on the spot the most remarkable events, and the views of the cities and fortresses which had been the scene of the most memorable victories, and from these sketches he composed the paintings which were to perpetuate the remembrance of the king's successes. Such opportunities enabled him to attain that perfection in his art, of which his numerous works give such evidence. They are distinguished by truth to nature, excellent colouring, freedom of touch, and the happiest distribution of light and shade. No painter excelled him in designing the motions and attitudes

of horses; and this induced his friend Le Brun, whose niece he married, to give to him the execution of the horses in his celebrated paintings of the battles of Alexander the Great. Van der Meulen painted also landscapes, and other subjects, with equal excellence. His principal works are at Paris; but many of his easel pictures are preserved in England, France, and Flanders. In the 16th and 18th vols. of the *Cabinet du Roi*, there are 152 engravings after his works. He was chosen member of the French Academy of Painting in 1673. He died in 1690, at the age of 56 years. His most celebrated scholar was I. Van Huchtenburg, battle-painter to Prince Eugene.

MEUN. [LOIRET.]

MEURSIUS, JOHN (the Latinized form of his real name, which was De Meurs), was born near the Hague, in 1579. He was educated at the university of Leyden; and after he had completed his studies, was entrusted with the education of the children of Barneveldt. [BARNEVELDT.] In 1610, Meursius was appointed professor of history at Leyden, and in the year following professor of Greek. After the execution of Barneveldt, on the 14th of May, 1619, Meursius was exposed to great annoyance and persecution from the enemies of his illustrious patron; and it was therefore with great pleasure that he accepted an invitation from the king of Denmark, in 1625, to settle in his dominions. Meursius died on the 20th of September, 1639.

Meursius was a diligent and laborious scholar. He edited several Latin and Greek writers, and wrote many works on historical and archæological subjects, which were collected and published by Lami, Florence, 1741-63, 12 vols. folio. The following are a few of his principal works:—1, 'Glossarium Græco-barbarum,' Loyd., 1614. 2, Various treatises on different branches of Greek and Roman antiquities, most of which are reprinted in the 'Thesaurus' of Grævius. 3, 'Rerum Belgicarum Liber Primus,' Leyden, 1612. 4, 'Historia Danica,' Copenhagen, 1630.

MEURTHE, a department in the north-east of France, bounded on the north by that of Moselle, on the north-east and east by that of Bas Rhin, on the south-east and south by that of Vosges, and on the west by that of Meuse. Its form is compact; the greatest length is from east to west, from the neighbourhood of Phalsbourg to that of Commercy (Meuse), 70 to 71 miles; its greatest breadth, at right angles to the length, is from the bank of the Moselle, between Pont-a-Mousson and Metz, to the neighbourhood of Mirecourt (Vosges), 46 miles. It area is estimated at 2357 square miles, which is nearly the average extent of the French departments, and rather greater than the conjoint areas of the English counties of Kent and Surrey. The population in 1831 was 415,568, in 1836 it was 424,366, showing an increase in five years of 8798, or above 2 per cent., and giving 180 inhabitants to a square mile. Both in amount and density of population it considerably exceeds the average of the departments, but falls considerably short of the average density of population in England. Nancy, or Nanci, the capital, is in 48° 41′ N. lat., 6° 11′ E. long., 172 miles in a direct line east of Paris, or 204 miles by the road through Château-Thierri, Châlons-sur-Marne, Vitry-sur-Marne, Bar-le-Duc, and Toul.

The department is hilly, and even mountainous. The principal chain of the Vosges crosses the eastern extremity between Sarrebourg and Phalsbourg; and branches from this mountain chain, of gradually diminishing height, extend over the eastern portion of the department. Near the principal chain of the Vosges the mountains are intersected by narrow valleys, which frequently present picturesque scenery. Amid the lower slopes are several lakes, as those of Lindre, Stock, &c.; there are also several marshes. The western side of the department is traversed by the hills which bound on the east side the narrow valley of the Meuse, and separate it from that of the Moselle. Between these hills and the Vosges is the valley of the Moselle. The Vosges in this department are composed chiefly of the new red or saliferous sandstone and the subjacent secondary rocks; the rest of the department is occupied by the rocks which intervene between the chalk and the red sandstone. The mineral treasures of the department comprehend freestone for building, and limestone, which are quarried in numerous places; gypsum is also abundant, and good marble is quarried near Nancy. Various ores of iron are found, but not in sufficient quantity to make it worth while to extract them. There are two forges for producing wrought-iron. The most important mineral is rock-salt, of which a vast bed was discovered in 1819, within a mile of the town of Vic on the Seille, at a distance of rather more than 200 feet below the surface. In penetrating about 100 feet lower, five strata of rock-salt were found, having an aggregate thickness of nearly 90 feet, separated from each other by thin strata of gypsum or clay. A sixth stratum has been discovered a few feet below the others: these strata have been ascertained to have a superficial extent of 230 square miles. The salt is pure muriate of soda. The working of the mine commenced in 1823. The cost of raising the salt and breaking it small is very trifling, about 8*s.* to 8*s.* 6*d.* per ton. The department has long been known for its brine springs, which have been estimated to produce yearly 41,000 to 42,000 tons: the principal springs are in the valley of the Seille at Dieuze, Château Salins, and Moyenvic; there are some in the valley of the Moselle, as that of Mousson near Pont-à-Mousson, and of St. Thiébault near Nancy. The cost of refining this salt is nearly double that of preparing the rock-salt.

The department belongs almost entirely to the basin of the Moselle: a small portion at the eastern extremity, which passes over the principal ridge of the Vosges, is included in the basin of the Rhine, of which indeed that of the Moselle is only a subdivision, and another small portion on the south-western border is included in the basin of the Meuse.

The Moselle enters the department on the south side, a little below the town of Charmes (Vosges), and flows north-west in a rather circuitous channel to Toul; at Toul it turns to the north-east, and flows in a circuitous channel to the junction of the Meurthe, from which point it flows north by west into the department of Moselle. Its whole course in the department may be estimated at 65 miles, for 18 of which (22 according to the government statement), viz. from the junction of the Meurthe, it is navigable.

The principal tributary of the Moselle in this department is the Meurthe. This stream, which rises in the western slope of the Vosges, several miles south-east of St. Dié (Vosges), and has a north-west course, enters this department just below the town of Raon l'Etape (Vosges), and flows north-west to Lunéville, where it receives the Vezouze on the right bank, and a mile or two lower down the Mortagne on the left. Below Lunéville the river makes a bend, but after passing the town of Rosières, and receiving the little river Sanon, it resumes its north-western course, and flows past Nancy into the Moselle. Its whole course may be estimated at 75 miles, of which nearly 50 are in this department; the navigation, which commences at Nancy, is of seven miles. It is used for floating timber from the neighbourhood of its source, and a considerable quantity of deals and firewood are sent down by it. It is subject to frequent inundations from the melting of the snow or the falling of heavy rains in the mountains where it rises.

The Madon, another considerable feeder of the Moselle, enters this department on the south side, and flows into the Moselle above Toul. Its source is in the heights south-west of Epinal (Vosges), and its whole course is above 40 miles, about 16 of which are in this department. It receives the little river Uory. The Math, a small stream, waters the north-west part of the department, and joins the Moselle just within the border. The Seille, a more considerable stream, waters the northern side of the department, and receives the Verbach and the Petite Seille; it joins the Moselle at Metz, in the adjacent department of Moselle. The Sarre, another and more important feeder of the Moselle, rises in the Vosges and waters the east side of the department, a few miles beyond which it becomes navigable. The Zorn, which rises just within the eastern boundary, flows into the Rhine; and the Deuil, which waters the south-western border, belongs to the system of the Meuse. There is one navigable canal, that of Les Salines de l'Est (the Eastern Salt-works), 22 to 23 miles long. It commences at the little town of Dieuze, on the Seille, and runs north-east into the Sarre at Sarrealbe (Moselle); only a part of it is in this department.

The department has eight Routes Royales, or government roads, the aggregate length of which (on January 1, 1837) was 261 miles, viz. 223 in repair and 38 out of repair. The principal road is that from Paris to Nancy and Strasbourg, which enters the department on the west side, and runs by Toul to Nancy, from whence it is continued, first along the valley of the Meurthe to Lunéville, and then along that of

the Vezouze to Blamont, from which town it runs north-east across the Vosges by Sarrebourg and Phalsbourg into the department of Bas Rhin. Another road branching off from this at Nancy, and rejoining it at Sarrebourg, runs through Château Salins and Moyenvic. Roads run from Nancy along the valley of the Moselle, downward to Pont-à-Mousson and Metz (Moselle), and upward to Charmes and Epinal (Vosges), and across the Moselle and the Meuse to Neufchâteau (Vosges) and Langres (Haute Marne). Roads lead from Château Salins, one to Metz, and another to Sarreguemines (Moselle); from Pont-à-Mousson to Commercy (Meuse) and Bar-le-Duc (Meuse), and from Luneville to St. Dié (Vosges) and Colmar (Haut Rhin). The aggregate length of the Routes Departmentales was (January 1, 1837) about 233 miles, viz. 168 in good repair, 42 out of repair, and 23 unfinished. The bye-roads and paths had an aggregate length of 3000 miles.

The climate of the department is colder than the latitude would lead us to suppose, a circumstance which is ascribed to the elevation of the eastern parts, the quantity of woodland, and the extent of water. The air is in most parts tolerably healthy. In the neighbourhood of the Vosges however the inhabitants of the valleys are very subject to putrid fevers. Intermittent fevers are prevalent in some districts, and in others the inhabitants are afflicted with large goitres, with scurvy or rupture.

About 760,000 acres, half the soil of the department, is under the plough; it is of various degrees of fertility, but the produce in grain is on the whole very far above the average of France; in wheat, which is the grain chiefly cultivated, the produce is twice the average; and in oats, which are cultivated to nearly or quite the same extent as wheat, the produce is nearly three times the average. In barley the produce is about equal to the average of France; of rye and maslin, or mixed corn, a comparatively small quantity is raised; and of maize and buckwheat scarcely any. Potatoes are cultivated very extensively.

Besides corn and potatoes, a considerable quantity of rape, colza, &c., for oil is grown; also flax, hemp, chicory, and pulse. A few hops are grown. The cultivation of the vine has much increased of late years. The vineyards now occupy above 40,000 acres, which is below the average of the departments, but the produce in wine is considerably above the average. The wine is for the most part thin and poor; some of the growths, as the red wines of Pagny-sous-Preny, Thiaucourt, Arnaville, Baudonville, Neuviller, and Vic, are agreeable and delicate. About 16,000 acres are laid out in orchards, gardens, and nursery-grounds. The fruit-trees are generally trained as espaliers. The stone-fruits are chiefly cultivated, particularly an oval plum of excellent flavour, called the Coëtche, of which great quantities are dried. The apricots of Nancy are in good repute. The quantity of woodland is about 280,000 acres; the abundance of fuel is a great advantage to the various manufactures of the department.

There are about 180,000 acres of meadow land, and about 15,000 acres of heath or common. The number of horned cattle is on the whole rather below the average of France. The quantity of cheese and butter made in the department is not equal to the consumption. Sheep are not numerous, and are of a large coarse-wooled breed. Horses are numerous but small. The antient dukes of Lorraine had done much to improve the breed by importing stallions from the Levant; they have however been suffered to degenerate. Horses are chiefly used for agricultural labour.

Poultry is abundant; but there are few bees. Wolves and foxes are numerous in the woods: there are also some wild boars, roebucks, and smaller game. Rats, mice, field-mice, and moles commit considerable devastations, and caterpillars are numerous and destructive.

The department is divided into five arrondissements, as follows:—

	Area in sq. miles.	Population. 1831.	1836.	Communes.
Nancy, central	551	127,944	129,841	187
Château Salins, north	418	69,810	70,287	147
Lunéville, south	468	82,851	84,698	145
Sarrebourg, east	461	72,546	75,499	116
Toul, west	459	62,417	64,041	119
	2357	415,568	424,366	714

There are 29 cantons, or districts, each under a justice of the peace.

In the arrondissement of Nancv or Nanci are—Nancv (pop. in 1831. 29,000 town, 29,783 whole commune; in 1836, 31,445 commune) [NANCY]; Rosières (pop. 2463 town, 2507 whole commune), and St. Nicholas (pop. 3006 town, 3013 whole commune) on the Meurthe; Pont-à-Mousson (pop. 6993 town, 7218 whole commune) on the Moselle; Haroué, on the Madon; Vézelize (pop. 1742) on the Uory; and Nomeny on the Seille. At Rosières (still distinguished as Rosières aux Salines, though the salt-works from which it gained its name have been long abandoned) is one of the finest of the royal studs in France; there is much meadow land round the town, and many horses are bred. St. Nicholas has a fine old Gothic church, a town-hall, and an abattoir, or public slaughter-house, lately built. There are mills, moved by water, for spinning cotton and woollen yarn, trimming manufactories, and tan-yards. Pont-à-Mousson is on a slope in the midst of a valley surrounded by fruitful hills. It is divided by the Moselle into two parts, which communicate by a bridge. There are some good houses in the town, and the streets, which are inconveniently paved with round stones, are tolerably straight. It has a good place or square surrounded by arcades; the town-hall is in this square. The principal church and the church of the Seminary are on the right bank of the Moselle; the first has two towers resembling crowns; the second has a portico overcharged with ornaments. The manufactures of the town are chiefly earthenware, especially artificial stone, much used for water-courses, reservoirs, flat roofs, &c.; and beet-root sugar, of which last there are four factories. The earthenware is exported into the adjacent departments. On an eminence near the town have been found antiquities which show that its summit was antiently occupied by a temple of Jupiter. There was formerly a university at Pont à-Mousson, founded by Charles III., duke of Lorraine.

In the arrondissement of Château Salins are—Château Salins (pop. in 1831, 2708; in 1836, 2621), on the Petite Seille; Dieuze (pop. 3892), Marsal, Moyenvic, and Vic (pop. 3119 town, 3186 whole commune), on the Seille; Vergaville, on the Verbach, and Insming, near the Albe, a feeder of the Sarre. Château Salins derives its name, and formerly derived its importance, from its brine-springs; but the salt-works have been given up. The town is in a pleasant valley at the junction of four roads leading respectively to Metz, Nancy, Sarrebourg, and Sarreguimnes. The inhabitants trade in saffron and hosiery. Dieuze has brine-springs, a salt-mine, and salt-works; there is also a manufactory of artificial soda from the refuse of the salt-works and from rock-salt. Salt has been made from the brine-springs of Dieuze for 800 years. It was a place of some importance under the Romans, who called it Decem Pagi. There are some Roman antiquities in an islet in the étang or lake of Lindre, which is near Dieuze.

Marsal is a fortress; it was bombarded by the allies in 1815, and has now a population of scarcely 1000. It is situated in a marshy plain; the foundation of the town consists of a layer of brickwork formed by the Romans. Moyenvic is a town of about 1500 inhabitants, who are chiefly engaged in making salt from the brine-springs. The town was dismantled by Louis XIV. Vic has also salt-works. The salt-mine opened in the bed of rock-salt near this town was inundated with water from a subterraneous reservoir; but another mine has been opened at Dieuze.

In the arrondissement of Lunéville are—Luneville (pop. in 1831, 12,216 town, 12,341 whole commune; in 1836, 12,798 commune) [LUNEVILLE], on the Vezouze, very near its junction with the Meurthe; Baccarat (pop. 1670 town, 2809 whole commune), on the Meurthe; Gerbevillers (pop. 3014) on the Mortagne; Bayon on the Moselle; Einville on the Sanon; Blamont (pop. 2281) on the Vezouze; and Badonviller (pop. 1814 town, 2297 whole commune) on the Blette, a small feeder of the Vezouze. Baccarat is at the foot of a steep hill, and near an extensive forest. One of the principal manufactories of flint and cut glass in France is in this little town. The river Meurthe brings down the timber for fuel from the Vosges, and supplies a moving power to the machinery for cutting glass, for which purpose there are two hundred lathes. The artisans with their families are lodged in the establishment, and form a population of 600. Many females in the neighbourhood find employment in different branches of this manufacture. Blamont was formerly the residence of the princes of Salm-Salm. It is now a busy little town, where calico is woven and printed,

leather in considerable quantity made, woollen yarn spun, and common iron goods and hardwares manufactured. There are manufactories of earthenware and pottery in the neighbourhood. Badonviller has a manufactory of dies and punches.

In the arrondissement of Sarrebourg are—Sarrebourg (pop. in 1831, 2136 town, 2164 whole commune; in 1836, 2340 commune), Lorquin, and Fenéstranges on or near the Sarre; and Lixheim and Phalsbourg (pop. 1981 town, 3529 whole commune) amid the steeper slopes of the Vosges. Sarrebourg existed in the time of the Romans, by whom it was called Pons Saravi, 'the bridge of the Saravus or Sarre.' The townsmen manufacture cottons, paper, cordage, architectural ornaments, and ornaments for the fitting up of rooms. At Phalsbourg fine liqueurs are prepared. This little town, which is fortified, and defends one of the defiles the Vosges, was built in 1570 by George John, count Palatine of the Rhine, from whom it obtained its name, which in its German form, Pfalsburg, means 'the town of the Palatine.' The town is supplied with water by a fountain of admirable construction.

St. Quirin (pop. 1523 village, 1960 whole commune) and Cirey (pop. 1768 village, 2193 whole commune), though only villages, require notice for the extensive plate and other glass works established in them. Coloured glass and mirrors like those of Nürnberg are made here. St. Quirin is surrounded by vast forests which supply fuel to its glass-houses. At Cirey earthenware is manufactured.

In the arrondissement of Toul are—Toul (pop. in 1831, 7208 town, 7304 whole commune; in 1836, 7333 commune) and Dieulouard on the Moselle; Essey and Triaucourt on the Math; and Colombey near the Deuil. Toul existed in the time of the Romans, by whom it was called Tullum; it was the capital of the Leuci, a Belgic people. In some deeds of the time of the Carlovingian princes, it is called Leuci. The fortifications, which were commenced under Henri IV. and carried on under Louis XIV., have been lately repaired. It was formerly the seat of a bishop. The former cathedral is an antient Gothic building with two towers resembling those of the principal church of Pont-à-Mousson. The ex-episcopal palace is a handsome building. Toul is not a place of much trade. There is a manufactory of earthenware and porcelain, which is noted for its strength and whiteness, the beauty of its enamel, and the variety of its colours. There are a high-school, an agricultural society, and several military establishments. Wine (of which the surrounding district produces abundance) and brandy are articles of trade.

The population of the above towns, where not otherwise mentioned, is of the whole commune, and from the census of 1831.

The manufactures of the department are considerable; the principal are woollen, linen, and cotton goods; trimmings and embroidery; hats, salt, glass, oil, leather, earthenware, and pottery; beet-root sugar, paper, cordage, hardwares, liqueurs, and some chemical productions. There are bell and type foundries.

The department constitutes the diocese of Nancy, the bishop of which is a suffragan of the archbishop of Besançon. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of that city; and in the third military division, the head-quarters of which are at Metz. It sends six members to the Chamber of Deputies.

In respect of education this department is the eighth in France. Of every hundred young men enrolled in the military census of 1828-29, sixty-eight could read and write; the average of the departments of France being only about thirty-nine.

At the time of the Roman conquest, this department formed part of the territories of the Mediomatrici in the north, and the Leuci in the south. A very small portion of the eastern side may have been included in the territory of the Tribocci, a Germanic people, who had settled on the left bank of the Rhine. Under the Romans the Mediomatrici and the Leuci were comprehended in the province of Belgica Prima, the Tribocci in that of Germania Prima or Superior. The Roman or Gallic towns within the limits of the department were Tullum (Toul), the capital of the Leuci; Scarpona, another town of the Leuci (near which Jovinus, a Roman general of horse, defeated the Allemanni, A.D. 366, and which sustained a siège against Attila), now Scarponne, or Charpagne, near Dieulouard on the Moselle; and Decem-pagi, now Dieuze, and Pons Saravi, now Sarrebourg (not Sarrebruck, as some from the name have supposed), two towns of the Mediomatrici. The department was early comprehended in the conquests of the Franks. Its subsequent history is given elsewhere. [LORRAINE.]

MEUSE, or MAAS. [RHINE.]

MEUSE, a department in the north-eastern part of France, bounded on the north by the Belgian frontier and the department of Ardennes; on the north-east by the department of Moselle; on the south-east by that of Meurthe; on the south by that of Vosges; on the south-west by that of Haute Marne; on the west by that of Marne; and on the north-west by that of Ardennes. Its form approximates to that of an oval, having its greatest length, from north by west to south by east, from the neighbourhood of Mouzon (Ardennes) on the Meuse, to the neighbourhood of Gondrecourt on the Ornain, 85 miles, and its greatest breadth, at right angles to the length, from the neighbourhood of Revigny on the Orne, to that of Triaucourt (Meurthe) on the Math, 46 miles. Its area is estimated at 2402 square miles, which is rather below the average area of the French departments; and rather exceeds the conjoint area of the adjacent English counties Hants and Berks. The population in 1831 was 314,588; in 1836 it was 317,701; showing an increase in five years of 3113, or about 1 per cent., and giving 132 inhabitants to a square mile. Both in amount and density of population it is considerably below the average of the French departments, and still farther below the English counties with which we have compared it.

Bar-le-Duc, the capital, is on the Ornain, in 48° 46′ N. lat. and 5° 9′ E. long., 126 miles east of Paris in a direct line, or 152 miles by the road through Epernay, Châlons, and Vitry-sur-Marne.

The department is traversed in the direction of its length by the two ranges of hills which enclose between them the narrow valley of the Meuse. The westernmost of these ranges separates the basin of the Meuse from that of the Seine; and is known in one part by the name of 'the heights of Argonne.' A range of hills branches off from these in the south part of the department, and runs north-west by Ligny and Bar-le-Duc, separating the valley of the Aire from that of the Ornain. The heights to the east of the valley of the Meuse separate it from the basin of the Moselle.

The department belongs to the district occupied by the rocks which intervene between the chalk and the new red or saliferous sandstone. There are numerous iron-mines in the hills, also quarries of excellent freestone, and vast slate-quarries. Potters' earth and marl are dug; and the strata afford a variety of curious fossils. There were, in 1834, thirty-six iron-works in the department, chiefly in the southern part. There were in these establishments twenty-eight furnaces for smelting the ore and making pig-iron; and sixty-seven forges for the production of wrought-iron. Charcoal is the fuel chiefly employed; the extensive forests of the department afford great facilities for procuring it. In the iron-works of Abainville near Commercy coal is used.

The central valley which traverses the department in the direction of its length, and the north-eastern portion of the department, belong to the basin of the Meuse; which river enters the department about 38 miles from its source and flows north-north-west through the central valley 95 to 100 miles, past Commercy, St. Mihiel, Verdun, Dun, and Stenay, into the department of Ardennes. The navigation commences at Verdun. The Meuse receives scarcely any tributaries in this department. The Othain and the Loison (with its feeder the Tinte), which water the north-eastern parts, fall into the Chiers, a tributary which flows across the north extremity of this department and joins the Meuse in the adjacent department of Ardennes.

The eastern side of the department belongs to the basin of the Moselle, a subdivision of the great Rhenish basin; and is watered by the Ornes, the Longeau, the Yron, the Math, and other small streams belonging to the system of the Moselle.

The western side of the department belongs to the basin of the Seine. The Aire, a tributary of the Aisne, rises in the south part and flows nearly parallel to the Meuse, about 50 miles past Clermont-en-Argonne and Varennes, into the department of Ardennes. The Aisne itself has its source and a small part of its course in the department. The Ornain, or, as it is called in the lower part of its course, the Orne, enters the department on the south and flows north-

west, 50 miles past Gondrecourt, Ligny, and Bar-le-Duc, into the department of Marne. The Saulx, a feeder of the Orne, also waters this part.

There are several étangs, or pools, in the department, especially in that part which belongs to the basin of the Moselle. The most considerable, which is about two or three miles long, and in one part nearly two miles broad, is near the village of Woel. The river Yron flows through it.

The navigation of the Meuse within this department is given in the official statements at 53 miles; there are no navigable canals.

The Routes Royales, or government roads, had in 1837 an aggregate length of 317 miles, of which the whole, excepting 5 or 6 miles, were in good repair. The principal roads are those from Paris by Châlons-sur-Marne (Marne) to Metz (Moselle); and from thence to Mayence and Frankfort in Germany; and from Paris, also by Châlons to Nancy (Meurthe) and Strasbourg (Bas Rhin). These roads both cross the department from west to east, the former in the northern part, through Clermont-en-Argonne and Verdun; the latter in the southern part, through Bar-le-Duc and Ligny. The road from Paris by Longwy (Moselle) to Luxembourg in Belgium, and Treves and Coblentz in Germany, branches off from the Metz road at Verdun, and runs north-eastward through Etain. A road from Dijon (Côte d'Or), Langres (Haute Marne), and Neufchâteau (Vosges), runs along the valley of the Meuse by Commercy, St. Mihiel, and Verdun, into the department of Ardennes, and so into Belgium; with a branch from between Neufchâteau and Commercy, to Ligny and Bar-le-Duc. A road from Troyes (Aube) to Nancy (Meurthe) crosses the southern part of the department.

The Routes Départementales had at the same time an aggregate length of 170 miles; of which the whole (except about 20 miles) was in good repair. The bye-roads and paths had an extension of above 6000 miles.

The climate of the department is cold (especially on the higher lands, some of which are of considerable elevation) and moist, but it is considered healthy. The soil in the valleys and on the hill sides is very fertile: a large portion of it consists of a rich loam. About 840,000 acres, rather more than half the surface of the department, is under the plough. The produce in grain is very considerable, especially in wheat, barley, and oats: that of barley is nearly three times as much as the average produce of the French departments; that of oats is above the average, but, from the great number of horses reared, is insufficient for the consumption of the department. But little rye and maslin, or mixed corn, is grown; and neither maize nor buckwheat is at all cultivated. Potatoes are grown in considerable quantity, also rape-seed for oil, flax, hemp, pulse, and fruit of every kind, but especially gooseberries. Orchards and gardens occupy above 18,000 acres. The vineyards occupy about 35,000 acres, and are chiefly in the south-west part of the department. The wines are in general of good quality, especially the red wines of Bar-le-Duc. The woodlands occupy from 340,000 to 350,000 acres, of which about 100,000 acres belong to the state, about 220,000 to the communes and to the public establishments; the rest is private property. The chief forest trees are the oak, beech, and elm. The timber and firewood supply the wants of the department, and furnish an article of export to the department of Ardennes and the departments in the basin of the Seine.

There are about 124,000 acres of meadow land, the best of which is in the valley of the Meuse; and 30,000 acres of heath or other open pasture. A great number of horses of a small breed are reared; the whole number in the department may be estimated at more than 60,000, above twice the average number in the other departments. They are employed, to the exclusion of oxen, in nearly all the labours of agriculture. The number of horned cattle is about equal to the average of the departments, viz. about 80,000. The dairy is much attended to; excellent butter is made, and cheese, which resembles that of Gruyère. The number of sheep is not great; the breeds have been improved by crossing them with those of England and Holland. There are some pigs reared, and a few goats; poultry is abundant. The forests contain wild boars and roebucks; and small game abounds in all parts of the country. A great number of red-breasts are taken every winter. The rivers and pools furnish plenty of fish, especially the pike, perch, loach, salmon-trout, and cray-fish.

The department is divided into four arrondissements as follows:—

		Area in sq. Miles.	Population in 1831.	Population in 1836.	No. of Communes.
Bar-le-Duc,	S.W.	569	82,134	80,952	128
Commercy,	S.E.	755	84,610	86,013	181
Montmédy,	N.	498	66,947	68,495	131
Verdun,	Central.	580	80,897	82,241	149
		2402	314,588	317,701	589

It is subdivided into 28 cantons, or districts, each under a justice of the peace.

In the arrondissement of Bar-le-Duc are—Bar-le-Duc (pop. in 1831, 12,496) [BAR], Ligny (pop. 3212), and Revigny (pop. 1598), on the Ornain; Vaubecourt, on the Aisne; Beauzée, on the Aire; and Ancerville (pop. 2239) near the south-western boundary of the department. Ligny, distinguished as Ligny-en-Barrois, is a pleasant little town, antiently fortified, but the walls are now in ruins. The parish church contains the monument of the Maréchal de Luxembourg. The inhabitants spin cotton-yarn and weave cotton goods, and carry on trade in wool and timber.

In the arrondissement of Commercy are – Commercy (pop. in 1831, 3622; in 1836, 3716), Maxey, Vaucouleurs (pop. 2157), Void, Sorey, or Sorcy (pop. 1634), and St. Mihiel (pop. 5822) in the valley of the Meuse; and Gondrecourt on the Ornain. Commercy is a pleasant town on the left bank of the Meuse, surrounded by a thickly wooded district. The streets are remarkably straight. There is a fine range of cavalry barracks, formerly a château built by the Cardinal de Retz. The inhabitants manufacture cotton-yarn and goods; there are also some iron-works. Vaucouleurs is built on the slope of a hill on the bank of the Meuse, and is surrounded by meadows. The inhabitants manufacture stockings, linens, and cotton goods. There are some tan-yards. Void is the depôt for rape-oil, which is made in abundance in the neighbouring part of the valley of the Meuse. It has some tan-yards, also paper-mills, and oil-presses moved by water. St. Mihiel was formerly a fortified town, and was besieged by Louis XIII. in person, who incurred so much danger in the siege, that on capturing the place he caused the fortifications to be razed. The situation of the town is very picturesque, but the houses are old. There was antiently a Benedictine abbey, the foundation of which gave rise to the town. The parish church, formerly conventual, contains the remains of several princes of the house of Lorraine and counts of Bar. Another church, that of St. Etienne (St. Stephen), is adorned with a fine piece of sculpture, a 'holy sepulchre' carved out of a single block of fine white stone, by Ligier Richier, a native of this part of France, and a pupil of Michael Angelo. There are at St. Mihiel cotton and woollen cloth manufactures, oil-presses, and tan-yards. The inhabitants trade in corn and wine; there are three yearly fairs. There are a subordinate court of justice, and one or two fiscal or administrative government offices; a high school, and a public library. There is a camp, supposed to have been occupied by Julius Cæsar, near the town.

In the arrondissement of Montmédy are—Montmédy (pop. in 1831, 2195; in 1836, 2201) on the Chiers; Marville on the Othain; Jametz on the Loison; Damvilliers on the Tinte; and Dun and Stenay (pop. 2681 town, 3140 whole commune) on the Meuse. Montmédy is an ill built town, but is of some consequence as a fortress. In 1815, being defended by about 100 soldiers of the line, and some national guards and custom-house officers, making in all 600 men, it resisted the attempt of a corps of 1500 Prussians to surprise it; the assailants lost 500 men. The inhabitants manufacture hosiery and hats, and leather: there are saw-mills and oil-mills. Stenay is a pleasant situation, and was formerly a place of strength, but was dismantled, A.D. 1654, by Louis XIV. There are barracks. There is in the town an extensive cooperage, in which the moving force of water is employed. There are considerable iron-works near Stenay. In the village of Avioth near Montmédy is an antient church accounted one of the finest specimens of Gothic architecture in France.

In the arrondissement of Verdun are—Verdun (pop. in 1831, 9978; in 1836, 10,577) [VERDUN], in the valley of the Meuse; Clermont-en-Argonne [CLERMONT] and Varennes (pop. 1652), on the Aire; Etain (pop. 3034), on the Ornes; and Fresnes, on the Longeau. Varennes was the place where Louis XVI. and his family were stopped in their at-

tempt to escape from France. There is a glass-house in the town. Etain or Estain is a tolerably neat town in a marshy plain. The inhabitants manufacture woollen cloth, flannel, leather, and paper. This town gave title to the French admiral Count d'Estaing.

The chief manufactures of the department are iron goods, glass bottles, paper, earthenware, and leather; cotton hose, lace, and cotton and woollen fabrics; and wicker-work. There are brandy distilleries and oil presses. The chief trade is in agricultural produce, corn, wine, oil, timber, &c., and in iron.

The department forms the bishopric of Verdun, the bishop of which is a suffragan of the archbishop of Besançon. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Nancy; and in the second military division, of which the head-quarters are at Châlons. It sends four members to the Chamber of Deputies.

In respect of education this department is in advance of every other in France. Of every hundred young men enrolled in the military census of 1828-29, seventy-four could read and write; while the average of the departments was under forty.

The department antiently formed part of the territories of the Verodunenses and of the Leuci: small portions of it were comprehended in the territories of the Remi, the Medromatrici, and the Treviri or Treveri: all these were Belgic nations. In the Roman division of Gaul the Remi were included in the province of Belgica Secunda; the other nations in Belgica Prima. Verodunum (or, as it is written in the Itinerary of Antoninus, Virodunum), capital of the Verodunenses, was the modern Verdun; Nasium, a town of the Leuci, was the modern Naix or Nais, a village on the Orne above Ligny; and Caturigis was in the vicinity of Bar-le-Duc. On the overthrow of the Western empire, the department came into the hands of the Franks, and formed part successively of the kingdoms of Austrasia and Lotharingia or Lorraine. The greater part of it was comprehended in the duchy of Lorraine and Bar; and the remainder in the bishopric of Verdun, one of Trois Evêchés (three bishoprics); or in the county of Champagne and the county of Clermont.

MEW, a name for the *Gull*. [LARIDÆ.] In falconry it signifies the place where hawks are kept.

MEXICAN STATES, THE UNITED, a federal republic in America, occupy the north-western and by far the greatest part of the Mexican isthmus, together with the south-western portion of the main body of North America: they lie between 15° and 42° N. lat. and 87° and 125° W. long. On the east the United Republic is washed by the Gulf of Mexico and the Bay of Honduras, a division of the Caribbean Sea; and on the south-west and west by the Pacific, which here forms the long Gulf of California. On the south-east it borders on Guatemala, one of the states of Central America, and on the British colony of Belize. On the north-east and north it is bounded by the states and territories of the United States of North America. The boundary-line on this side, according to a treaty, begins on the east at the mouth of the river Sabine, and follows its course northward to the point where it is intersected by 32° N. lat.; it then continues along the meridian of 94°, until it reaches Red River. The line ascends the last-mentioned river to the point where it passes the meridian of 100°, and proceeds along this meridian northward to the Arkansas river, which constitutes the boundary-line westward to its very source in the Rocky Mountains. From this range westward to the shores of the Pacific, the parallel of 42° separates the territories of both republics. As large tracts along the northern boundary are quite unknown, the area of this extensive country can only be approximated to. It probably occupies a surface of about 1,500,000 square miles, or more than seven times the area of France.

Surface; Soil; Climate; Rivers.—This immense country is divided by nature into three regions, each of which is marked by different features. The first comprehends the countries lying to the east of the isthmus of Tehuantepec, which is crossed by the meridian of 95° west of Greenwich: we shall call it the Eastern Region. The second extends from the meridian of 95° in a curved line to the mouth of the Rio del Norte on the east (26° N. lat.), and to the most northern recess of the Gulf of California (32° N. lat.) on the west: it is the Central Region, or Anahuac. The third or Northern Region comprehends the countries situated north of a line drawn from the mouth of the Rio del Norte to that of the Colorado.

The *Eastern Region* comprehends the peninsula of Yucatan, the western declivity of the table-land of Guatemala, the plain of Tabasco, and the isthmus of Tehuantepec. The north-eastern extremity of the peninsula of Yucatan, near Cape Catoche, is hardly more than 150 miles distant from Cape S. Antonio, the most western extremity of the island of Cuba. Through the strait formed by these headlands a current with considerable velocity sets in to the north. The earthy particles brought by this current are deposited along the northern and western shores of the peninsula, where the current is much less rapid. These shores have no harbours, but only roadsteads, which during the northern gales are very unsafe; but along the eastern shores there are several harbours. The shores are sandy and flat. The level country extends to a considerable distance inland, whilst the centre of the peninsula is occupied by a range of low hills, or rather a long and comparatively narrow table-land enclosed by two ranges of low hills. The country along the Bay of Honduras is well watered, and exhibits a vigorous vegetation, both in its trees, which are of heavy growth, and in the great variety of its plants; but the soil is nearly uncultivated, the scanty population being chiefly employed in cutting mahogany, with fustic and several other dye-woods. The hilly district in the interior, as well as the flat country on the northern coast, has a sandy soil, and no spring-water is found from Cape Catoche to the mouth of Rio de S Francisco, which empties itself into Campeachy Bay; and even as far south as the Laguna de Terminos spring-water is scarce. Its vegetation is scanty: the trees are stunted, and the plants of a languid growth, except during the rainy season (from May to September); but as the climate, though exceedingly hot, is healthy, it is much better inhabited and cultivated than the eastern shores. The rains, though commonly abundant, sometimes fail, and such an event is followed by dearth.

The hills in the interior grow higher towards the point where the peninsula is connected with the table-land of Guatemala. The larger and higher portion of this table-land belongs to the state of Guatemala, and it is traversed by a ridge of high hills between the towns of Totonicapán and Gueguetenángo. [CENTRAL AMERICA.] From this ridge, which stands on a base elevated probably about 5000 feet above the sea, the country descends rather rapidly to the west, and where the boundary-line of Mexico and Central America crosses the table-land it is probably less than 3000 feet high. It continues to descend until it meets the plain of Tabasco, north of 17° N. lat. Its surface is far from being level, as it is furrowed by numerous watercourses: so that it may rather be considered as a succession of ridges of hills and of valleys than as an inclined plane. The climate is in general healthy, and its productions vary according to the different elevations of the surface. In some the productions of the West Indies are cultivated; in others wheat and some European plants are grown.

The plain of Tabasco begins on the east, at some distance east of the lagune of Terminos, and extends westward to Partida Rock, a moderately elevated cape, in which a range of hills, including the volcano of Tuxla, terminates (96° W. long.) on the shores of the Gulf of Mexico. This plain is more than 250 miles long, and extends inland from 50 to 120 miles. Its surface is a dead level, and the soil alluvial. Being very fertile, it is covered with a thick forest of heavy growth, but is little cultivated on account of its being subject to inundations, and generally under water for several months during the rainy season. It seems that this part of the Mexican States suffers as much from the superabundance of water as other parts from the want of it. To this circumstance, and to the great heat of the summer, the unhealthiness of this tract is to be attributed. Besides the common objects of agriculture in countries similarly circumstanced, as maize, plantains, and manioc, it produces a large quantity of cocoa and some coffee. Vanilla and indigo are stated to be common in the woods. Though the coast is generally low, parts of it are higher than any other portion of the coast of the American continent along the Gulf of Mexico. Between the lagune of Terminos and the mouth of Tabasco river are the heights of S. Gabriel, a range of hills running east and west about 30 miles, at a short distance from the shore; and where the plain terminates on the west is Cape Partida Rock, the extremity of a somewhat elevated and rocky shore, which extends

about 30 miles south-south-east and north-north-west. The Laguna de Terminos is about 60 miles long from north-north-east to south-south-west, and 30 miles wide on an average; but in many places it has hardly four feet of water, and the three or four channels by which it is connected with the gulf are hardly passable for large boats. The water is brackish. The plain of Tabasco is watered by a considerable river, the Rio de Tabasco, and its two branches the Usumasinta and the Grijalva, of which the former rises in two branches on the eastern corner of the table-land of Guatemala, and flowing in a direction generally north by west, forms a considerable cataract south of 17° N. lat., where it descends from the table-land. Above this waterfall it is navigable for canoes, and below it for larger boats. This is also the case with its tributary, Chacamas: this river rises in the hills on which stand the ruins of Palenque, the most northern offsets of the table-land of Guatemala. The Usumasinta joins the Rio de Tabasco a few miles above its mouth, after a course of more than 300 miles. The other branch, the Grijalva river, rises in the range of high hills in Guatemala, between the towns of Totonicapán and Gueguetenángo, and runs with many bends in a wide valley in a north-west direction, until it issues from it near the isthmus of Tehuantepec, where it turns to the north-east by a bold sweep, and receives the name of Rio de Tabasco. It traverses the whole plain in a rather oblique direction, and appears to be navigable in this part for boats of considerable burden. Before it joins the Usumasinta it is navigable for vessels of moderate size, which ascend as far as Villa Hermosa. After having joined the Usumasinta, it falls into the Gulf of Mexico at Port Victoria, after a course of about 350 miles.

The plain of Tabasco occupies the northern portion and about one half of the isthmus of Tehuantepec. The southern half comprehends a mountain-ridge and a smaller plain. The most western declivity of the table-land of Guatemala assumes the form of a ridge at about 94° W. long., which, running due east and west, connects the last-mentioned table-land with the elevated plains of Anahuac. This ridge (or rather these ridges, for there are several, running nearly parallel to one another) occupies between 35 and 40 miles of the isthmus. It is called Cerro Pelado, and probably does not rise above 2000 feet. Being entirely covered with trees of heavy growth, it is also known by the name of the Forest of Tarifa. The southern plain, or that of Tehuantepec, is about 25 miles wide, and extends along the Pacific from the boundary of Guatemala to some distance west of the town of Tehuantepec. It has a very hot but rather dry climate, and the soil, though not distinguished by fertility, is capable of producing several tropical plants. It is supposed that an easy line of communication may be established across the isthmus of Tehuantepec, between the Gulf of Mexico and the Pacific, as the two seas are only 140 miles distant, and the two plains are watered by navigable rivers. The river Chimalapa, descending from the Cerro Pelado, traverses the plain of Tehuantepec; and though its whole course perhaps does not exceed 50 or 60 miles, it has much water, and is navigable to S. Miguel de Chimalapa, a distance of about 30 miles. On the same Cerro, but within the northern ridges, rises the Rio Huasacualco, which first turns to the west, and then to the north, breaking through some of the ridges of the Cerro Pelado. In this part of its course it is joined by numerous small rivers, which descend from the western declivity of the table-land of Mixtecapán, and it soon becomes a powerful river, though it is not navigable on account of rapids or cataracts. As soon as it enters the plain of Tabasco its course is gentle, and there is no further obstruction to the navigation. Its mouth, which is situated in the south-western recess of the Gulf of Mexico, is however so choked by a bar and shoals, that vessels even of small size cannot enter it.

The *Central Region* of the Mexican States may be called Anahuac, though this name was used before the Spanish conquest to designate only the country as far north as 21° N. lat., and did not comprehend the northern district, which we include in this region. In its natural features it exhibits great variety.

We begin our survey with the eastern coast, which is low and sandy from the Punta de Rocca Partida (18° 40′ N. lat.) to the most north-eastern corner of the Gulf of Mexico (about 29° N. lat.), and still farther eastward. It runs on in a continuous line, without being broken by inlets or bays; and consequently it contains no harbours except those formed by the mouths of the rivers; and even these are only unsafe roadsteads, as the rivers of this coast (between 18° 40′ and 22° N. lat.), with the exception of the Rio Alvarado, have only water enough in the rainy season. North of 22° several rivers of considerable size fall into the sea, but except at their mouths the coast cannot be approached by vessels, as it is lined by long, low, and narrow islands, which lie parallel to, and from two to six miles from it. The channels by which these islands are separated are too shallow to admit even boats. The country adjacent to the shores, and from three to ten miles inland, is very low, but is defended from the sea by sand-hills rising from 50 to 200 feet high. The soil is sandy and destitute of vegetation, with the exception of a few stunted shrubs and some hardy plants. At the back of this low sandy tract the country rises gradually to the foot of an extremely steep ascent, which constitutes the eastern edge of the extensive table-land farther west. The country which lies between the shores and the steep ascent varies in width. At Vera Cruz (near 19° N. lat.) it is only about 60 miles wide, and this may be considered as its average breadth south of 22°. Farther north it widens, and at Saltillo (26° N. lat.) it is more than 180 miles across. Its acclivity can only be called gradual in comparison with the steep ascent which borders it, for, as far as is known, it attains an elevation of 2500 or 3000 feet at a distance of only 50 miles from the sea. In the wider portion of this tract, north of 22° N. lat., a small number of isolated hills, generally of considerable height, are scattered over the inclined plain; those north of Monterey are the highest, and are visible at a great distance.

This tract is comprehended in the Tierras Calientes, or 'hot countries.' The seasons are divided into the winter, or the season of the north winds, and the summer, or season of the breezes. The former lasts from October to April, during which time the north winds (los nortes) are prevalent, and frequently blow with the force of a hurricane, sometimes for days together. They are the terror of navigators on these shores. During this period the coast is healthy, and the vomito prieto, or yellow fever, ceases. The mean heat of this season is 71° of Fahrenheit, but whilst the north winds are blowing the thermometer sometimes descends to 60°. Rain is not rare during this season, but the showers are only of short duration. During the summer the heat is great; the mean temperature is about 81°, and in July and August is about 82°. The rains are not heavy before June, but in that month they descend in torrents nearly every day for several hours. In July alone about fifteen inches of rain fall, or two-thirds of the mean annual quantity at London. In this season, but especially towards the end of it, in September and October, the vomito prieto is prevalent, and very destructive among the white inhabitants. This disease however only occurs in the lower part of the country: places which are at an elevation of 2500 feet are entirely free from it. The mean annual heat of this tract is 77°. It is extremely well adapted for the cultivation of all tropical products, and as its soil, with the exception of the sandy shores, is possessed of a considerable degree of fertility, it produces rich crops of Indian corn and rice where it can be irrigated. Bananas, pine-apples, oranges, and manioc are also cultivated. The products adapted for exportation are chiefly coffee, sugar, and cocoa, and a small quantity of cotton; vanilla and jalap are collected in the woods, with which a great part of this region, especially that near the steep ascent, is thickly covered.

The steep ascent which bounds this tract on the west rises in some places in terraces, which lie between the declivities; and in such places the ascent occupies a considerable space; but in other parts it rises from 5000 to 6000 feet in a distance generally not exceeding ten miles in width, and frequently much less. The acclivity is so steep that on the whole line there are only two places where it is practicable for carriages, namely, at Xalapa, near Vera Cruz (19° N. lat.), and at Santillo, west of Monterey (26° N. lat.), though its whole length probably does not fall short of 600 miles. The rocks are generally too steep to maintain any vegetation beyond a few plants, but in the narrow ravines which intersect the acclivity a vigorous vegetation is found; in the lower part there are many oak-trees, and in the higher large pines.

The steep ascent just described constitutes the outer edge of the elevated plains of Anahuac, which extend westward to a great distance. The edge itself is lined by a continuous

series of hills rising in general only to a moderate elevation above the table-lands, but some of them attain a great height, as the Coffre de Perote, near the road leading from Vera Cruz to Mexico, which is 13,415 feet above the sea-level, and 5723 feet above its base, and the peak of Orizáva, which attains a height of 17,373 feet. The heights which line the margin of the table-land do not form a continuous chain, but appear rather isolated in the southern districts. North of 22° N. lat. however they constitute a continuous range of high mountains, considerably elevated above the adjacent table-land; and this chain extends to the north of the Real de Catorce (24° lat.). North of the group which surrounds this place they again sink down nearly to the level of the table-lands.

The elevated plains of Anahuac are divided into two parts by a range of mountains, which traverses them in a general eastern and western direction, and is called Sierra Madre. This chain begins not far from the eastern edge, near 21° N. lat., west of Tlacolula, with the mountains of La Encarnaçion, whence it continues in a west by north direction to San Felipe (21° 40′ N. lat.), which town is situated in a comparatively small plain enclosed by two branches of the range. Here an elevated and wide offset branches off to the southward, and stretches over the plain for about 50 miles, terminating with the group in which the mines of Guanaxuato are situated.

West of S. Felipe the range declines to the north-north-west, and its continuity seems to be broken into isolated ridges, as the Sierra de Altamira, about twenty miles east of Aguas Calientes, and the group of mountains which contain the mines of Zacatecas. But at no great distance west of Zacatecas the Sierra Madre re-appears in the decided shape of a mountain-range, and occupies a width of a hundred miles from east to west. Its direction is from south-east to north-west as far north as 28° N. lat., where it declines to the north, and terminates near 32° N. lat., in an isolated mountain-group called the Sierra de las Espuelas, having gradually diminished both in elevation and width. The elevation of this range is almost entirely unknown. The mountains of La Encarnaçion rise more than 10,000 feet above the sea, and about 4000 above their base; those enclosing the plain of S. Felipe are probably as high, especially those of La Tlachiquera. It would also seem that the range stretching north-west from Zacatecas is not less elevated for a considerable extent, though it sinks lower north of 28° N. latitude.

The elevated plains which spread out west of the steep ascent occupy the greatest part of the surface of Mexico. They are widest between 19° and 20° N. lat., where they occupy 360 miles from east to west. This extensive tract of country however is not one plain, but divided into four plains, unequal in extent, and separated from each other by ranges of hills, which rise from 500 to 2000 feet above their base. The most eastern plain may be called the plain of Tlascala, from the town of that name, which is situated nearly in its centre. Its surface is from 7000 to 7500 feet above the sea, and it occupies the space between 97° and 98½° W. long., and between 18½° and 20° N. lat. Its surface is pretty level: the hills, which occur on it at considerable distances from one another, rise only to a very moderate height, and the depressions are few and of small extent. Two isolated peaks of considerable elevation, the Cerro de Pizarro and Mount Malinche, are near the road which leads from the sea to Mexico. The parts of this plain which are contiguous to the eastern edge of the table-land are very sterile, the ground being covered with lava, and producing only a coarse grass, on which sheep pasture. This sterile tract, called *el mal pais*, occupies about one-third of the plain. Farther west the soil improves, and in many places the ground is covered with maize, wheat, and barley, or laid out in plantations of American aloes. The chain of hills which divides the plain of Tlascala from that of Tenochtitlan, contain the peak of Istaccihuatl (15,704 feet above the sea), and the volcano of Popocatepetl (17,884 feet), which last is the highest mountain in Mexico. The plain of Tenochtitlan, lying west of that of Tlascala, is between 19° and 20° N. lat. and 98° 30′ and 99° 30′ W. long., and about 7480 feet above the sea. Farther west is the plain of Toluca, which extends to 100° W. long., and is somewhat smaller in extent than that of Tenochtitlan, but likewise surrounded by chains of hills. In the southern chain is the Nevado de Toluca, which is 15,160 feet above the sea, and through the northern chain the Rio de Lerma forces its course. The surface of this plain is in many places uneven and broken, but it contains also extensive levels. As it is nearly 9000 feet above the sea-level, it is too cold to produce wheat, and it serves chiefly as pasture-ground. The most western of these extensive plains is that of Michoacan, which between 19° and 20° N. lat. extends from 100° to 104° W. long., and appproaches the Pacific within about 30 miles. Its surface in the eastern districts is about 6500 feet high, but towards the west it sinks down to 5500 feet. Far from being so level as that of Tlascala, this plain exhibits several broken and high ridges of hills, which enclose valleys of moderate width and great fertility. The mountains are covered with a fine growth of timber. The level country is fertile, and produces abundantly every kind of grain, but its elevation above the sea is still too great to admit the cultivation of tropical products. Nearly in the centre of this plain is the lake of Patzcuaro, famous in the history of the antient kingdom of Michoacan, whose capital, Tzintzontzan, was built on its banks. Towards the western extremity of the plain is the peak of Tancitaro, which is probably more than 10,000 feet above the sea.

From the western edge of the table-land of Michoacan, on which the small town of Zapotlan is built, the country declines rapidly to the plain of Colima, which seems to resemble in most respects the low tract along the Gulf of Mexico. It appears to be generally level and not much elevated above the sea. On this plain the isolated volcano of Colima rises to a great height. This country is fertile, and is capable of producing all the tropical plants; but it is badly cultivated.

On the north the table-lands just mentioned border on others of a similar description. On the south the country descends rapidly and with a very irregular surface, except where it borders on the plain of Tlascala. This plain is joined on the south by that of Mixtecapan, which stretches from about 18° 30′ N. lat. southward to the very shores of the Pacific, where it terminates with high mountains, leaving only a narrow tract between them and the sea, from the plain of Tehuantepec on the east to the mouth of the Rio Yopez on the west, a space of 300 miles. We are less acquainted with the features of the table-land of Mixtecapan than with other parts of Mexico, as it has rarely been visited by European travellers, though it contains the best cultivated and most populous districts of the republic. It is however certain that the whole region, with the exception of a few depressions and the low tract on the coast, forms a table-land about 5000 feet above the sea. Its surface appears to be undulating, and sometimes to rise into hills. Towards the plain of Tabasco a chain rises to a greater elevation, though the highest summit, the peak of Senpueltepec, probably does not exceed 7500 feet. Indian corn and other grains are grown in abundance, and a great quantity of cochineal is collected on this table-land.

The table-land of Mixtecapan, stretching south and north, and extending westward to 98° 30′, forms nearly a right angle with the table-land which stretches east and west over the Mexican isthmus, between 19° and 20° N. lat. The countries which fill up this angle do not present in the least degree the features of a table-land, being covered with numerous narrow ridges running generally east and west, with valleys between these ridges sometimes wide enough to be called plains. Both the ranges and the valleys grow lower as they approach the shores of the Pacific. In passing the low ridges which enclose the table-lands of Tenochtitlan, Toluca, and Michoacan, on the south, we descend immediately to a country hardly 3000 feet above the sea, as is indicated by the sugar plantations which occur at Istla (3100 feet) and at Cuantla y Amilpas, not more than 30 or 40 miles south of the table-land of Tenochtitlan. Farther south the descent is less rapid, as the valleys, which are only 30 or 40 miles from the Pacific, are still about 2000 feet above it. The descent again becomes more rapid near the shores, on the margin of which there is a narrow level tract intersected with salt lagunes. This region is traversed nearly in its whole width from east to west by a river of considerable magnitude, the Rio Bolsas, or Rio de Zacatula, whose course exceeds 200 miles, its source being near the western edge of the plain of Mixtecapan. But this river is not navigable, its course being very rapid, even at its mouth. Towards the northern margin of this region is the volcano of Jorullo, which stands in the middle of a plain 2890 feet above the sea, the volcano itself being 4114 feet above the sea, or 1224 feet above its base. This volcano was formed

on the 29th September, 1759, in a violent eruption, by which a surface of between 24 and 30 square miles was raised several feet above the level of the plain. The volcano is surrounded by numerous conical hills of moderate elevation, from which smoke is continually issuing. From the mouth of the Rio Bolsas westward a low level plain extends along the Pacific, which joins that of Colima, and spreads about 30 or 40 miles inland. It is a tierra caliente, resembling, in climate, fertility, and productions, the low coast along the Gulf of Mexico, and, like the latter, it is very unhealthy; but the yellow fever, or vomito prieto, does not visit the shores of the Pacific. The mean annual temperature of these shores is considerably higher than that of the shores of the Gulf of Mexico, the thermometer, even during the cold season, hardly descending below 82°, and nearly all the year round maintaining itself in the day-time between 86° and 95°. This difference must be attributed to the absence of cold winds on this coast. The gales by which it is visited rather resemble hurricanes, and blow during the months of July and August from the south-west: sometimes they occur as late as September and October. From October to May the air is in general calm, and the sky cloudless; but the sun is nearly invisible on account of a fog, of an olive colour, which covers the whole sky in its upper regions, and does not affect the hygrometer. In this season some gales blow from the north-east or north-north-east, which are called the gales of Tehuantepec.

North of 20° N. lat. is the table-land of Queretaro, which extends to the ridge of the Sierra Madre, on the east to about 21° N. lat., but on the west to 21° 30′. That portion of it which lies east of 100° W. long. is in general about 6500 feet above the sea-level. Its surface is broken by single groups or short ranges of hills, which rise from 1000 to 1500 feet above the plain; but still there occur many level tracts of considerable extent and great fertility. This region contains numerous productive mines. The western and greater portion of the table-land (between 100° and 102° W. long.) is nearly a plain, rarely interrupted by hills. Its surface is on an average only 200 or 300 feet lower than that of the eastern portion. The central part of it is occupied by one of the richest agricultural districts on the Mexican isthmus, known under the name of Baxio, which extends from the neighbourhood of Queretaro along the Rio Santiago westward for several miles west of Salamanca, and thence in a northern direction to Leon. Its length exceeds 100 miles, and its average width probably 30 miles. It is covered with corn-fields, which, being irrigated by canals, yield rich crops of Indian corn and wheat. In the other districts many sterile tracts occur, which are either covered with stones, and then called *pedregal*, or with lava, in which latter case they always receive in Mexico the name of *mal pais*. The remainder is rather fertile, but cannot be cultivated where there are no means for irrigation, as the rains are far from being abundant in this region. Where a depression occurs in which the rain-water accumulates, a stone wall is generally erected to prevent it from running off, and the artificial pond or tank so made is called *presa*. By far the greater part of the country however cannot be irrigated at all, and is used only as pasture-ground. Some of the cattle estates are of immense extent, and keep many hundred thousand head of cattle and sheep. On this table-land the *barrancas* are more frequent: they indeed occur in other parts of the isthmus of Mexico, but not in such number nor of such dimensions. A barranca is a depression in the level country, having always a steep declivity, and descending frequently 1000 feet below the general surface of the country. These depressions are sometimes three or four miles wide, and still longer: they are covered with trees of a vigorous growth, which form a striking contrast with the bare surface of the table-land. The climate of these barrancas is considerably milder than that of the country about them, and approaches in some cases to that of the tierras calientes. Vegetation follows the course of a small stream which runs in the centre of the barranca. Several small towns are built in these depressions of the table-land.

It is hardly possible to determine the western boundary of the plain of Queretaro, as it is not marked by a continuous ridge of hills. From about 101° 30′ W. long., and from that point where the Sierra Madre turns northward, the country descends very gradually to the west, but with a broken surface, so as to present a succession of hills and valleys with some intervening plains, usually of no great extent; the plains in some places occupy the summit of the higher country, and are called *mesa* (table-land). The descent terminates about the meridian of Zapotlan, or Zapotlanéjo (102° 30′), where the productions of the tierras calientes appear, and the general level of the country extending to the shores of the Pacific may be estimated at about 4000 feet above the sea. This region, called the Plain of Xalisco, cannot be called a table-land, as its surface is very uneven, being in many places intersected with hills, frequently rising to a great height, with a steep ascent, though flat tracts of great extent are numerous, among which that about the town of Guadalaxara is distinguished by fertility. Though this region, as being among the tierras calientes, might produce most tropical plants, Indian corn and wheat constitute the principal articles of agriculture. The extent to which wheat is grown shows that the greatest part of this region cannot be below 4000 feet above the sea. In this country is the lake of Chapála, which is about 90 miles in length, and from 12 to 18 miles in breadth: the surrounding hills rise to a considerable elevation, and descend rapidly to the water's edge. The lake contains the island of Mescála, on which a number of Indians resisted the arms of the Spaniards from 1811 to 1814. The lake is noted for a kind of fish called *pescado blanco*, which occurs in most of the lakes of the table-lands, but nowhere attains such a size as in the lakes of Páscuaro and Chapála, whence it is sent to Mexico, slightly sprinkled with salt or preserved in snow.

The Rio Santiago, or Rio Grande, the largest of the rivers of the Mexican isthmus, principally traverses the regions just mentioned, having its mouth at S. Blas (21° 32′ N. lat. and 105° 18′ W. long.). This river rises in the highest of the table-lands, in that of Toluca, in a lake situated at the base of the range which divides this table-land from that of Tenochtitlan, and in an extensive morass surrounding the small town of Lerma, whence it is called, in the upper part of its course, Rio de Lerma. Its course across that region is rather gentle, until it breaks through the range of hills which separates the table-land of Toluca from that of Queretaro. It flows through the Baxio with a gentle course, and its waters are abundantly used for irrigation. Where it leaves the plain of Queretaro, it is closely hemmed in by precipitous mountains, full of rapids and bars, and runs quickly over a stony bed; in this part of its course navigation is entirely impossible, except for small canoes in the spaces between the rapids. On approaching the lake of Chapála its course becomes gentle, and before it enters the lake it passes through an extensive level tract, which is inundated by the river during the rains and is swampy all the year round. It enters the lake a few miles below La Barca, where it is 90 yards wide. The waters of the river may easily be distinguished from those of the lake, from which it issues on the north side not far from the town of Ocotlan, where it is 200 yards wide, and flows with an even and uninterrupted course to the Puente del Rio Grande, near Guadalaxara, where there occur in the space of less than three miles between fifty and sixty falls. Its course farther down, though less obstructed, is still very rapid, and at present at least not used for navigation. The course of this river considerably exceeds 400 miles in length.

The eastern part of the table-lands is drained by the river Panuco, which rises in the lake of Zumpango on the table land of Tenochtitlan. The waters of this lake are carried by the canal called the Desague de Huehuetoca to the Rio de Tula or Moctezuma [Mexico], which runs in a northern direction, inclining a little to the east to Tamisinchali, where it is called the Rio de S Juan. From this place it passes in the same direction to Miraflores, S. Juan, and Tanquichi. In this latter part of its course the river, which near its source is extremely rapid and frequently rushes forward like a torrent, becomes more gentle, and canoes may ascend it to S. Juan; but above Tanquichi the rapids are numerous and violent. From the last-mentioned place to Panuco, a distance of 87 miles by the numerous windings of the river, it may be navigated by large boats. Between these places the Rio de San Juan is joined, from the west, by the river Tamoin, and after this junction it is called Rio de Panuco, and changes its northern course into an eastern one. Five miles above Panuco, a ledge of rocks runs across the river, which, except in the rainy season, has only four feet water on it, and thus prevents large vessels from ascending it farther. Schooners therefore can only sail as far as Panuco, which is 80 miles by water and about 40 miles by land from the sea. The course of the river

below Panuco is exceedingly winding. It traverses a low and frequently swampy tract, covered with extensive forests, in which mahogany and different kinds of dye-wood are cut. At its mouth the river forms the harbour of Tampico. Its whole course, including the windings, can hardly be less than 400 miles.

The climate of these table-lands varies in proportion to their elevation above the sea. In those of Tenochtitlan and Tlascala, which are nearly equal in this respect, the mean annual temperature is 62°. In winter the thermometer generally ranges between 45° and 47°, and sometimes, though rarely, descends below 32°. In summer it never exceeds 75° in the shade. On the table-land of Toluca, which is the most elevated, the air is so cold during the greatest part of the day, that the thermometer generally varies between 42° and 46°, and even persons who have been brought up in northern regions find the climate very unpleasant. On the table-land of Valladolid, Mixtecapan, and Michoacan, which are considerably lower than Tenochtitlan, the mean annual temperature probably varies between 66° and 68°. All these countries, being more than 5000 feet above the sea-level, are called by the inhabitants Tierras Frias (cold countries). The winter is indeed not severe, but the summers are not warm. To the small difference of the temperature in the different seasons, and to the want of sufficient heat in summer, is to be attributed the fact that several plants do not grow in these countries, which thrive very well without the tropics and in places the mean annual temperature of which is considerably below that of the table-lands.

The seasons on the table-lands are only two, that of the rains (estacion de las aguas) and the dry season, or summer (el estio). The rains commence in June or July, and terminate in September or October; the rainy season consequently lasts only four months. The rains occur earlier in the countries approaching the eastern shores, and extend afterwards farther west. They are accompanied by thunderstorms, which are experienced successively at Mexico, Guadalaxara, and on the western shores. We are not acquainted with the quantity of rain which falls on any of the table-lands, but it is probably much less than that which falls on the low shores of the adjacent seas. The greatest quantity appears to fall along the range of the Sierra Madre and its branches. It would also seem that the table-lands which approach the Pacific have more abundant rains than those lying nearer the Gulf of Mexico. The table-land of Mixtecapan seems particularly favoured in this respect, as the rains begin in the month of May, and always continue to October; they are also more abundant. Though the rains are much less abundant on the table-lands than on the coast, they would be sufficient to maintain a vigorous vegetation, but for the rapid evaporation. To this must be added the peculiar nature of the soil, which covers rocks of a porous nature, by which the moisture is absorbed and carried too far below the surface; consequently all these table-lands have rather an arid soil, which can only be employed in the cultivation of grain where it can be watered; and even many of the rivers disappear in fissures of the rocks. The plains are entirely destitute of trees, but are covered with several kinds of cactus, a plant which grows best on an arid soil, and endures a considerable degree of cold. Forests of trees occur only on the hills and short ranges, which in several places are dispersed over the plains, and especially on their western declivities: the eastern declivities generally present bare rocks. For want of the means of irrigation, perhaps nine-tenths of the table-lands are only used as pasture, and the grass is sufficient for that purpose to the months of March and April, when the south-east wind, called viento de la Mistica, begins to prevail, which, being very dry and hot, withers the smaller plants and grass. In this part of the year the country has a very dismal aspect, and the cattle suffer much where there are no pasture-grounds that can be irrigated, until the beginning of the rainy season, when the surface of the ground is suddenly changed. The elevated table-lands of Mexico, like those of Tibet and Central Asia, which are still more arid, have also a large portion of their surface covered with muriate of soda and other saline substances, in the dry season, like a hoar-frost, which considerably diminish the productive powers of the soil.

The countries which are elevated from 2500 to 4000 feet above the sea-level, such as the broken region lying between the table-lands of Tenochtitlan, and Toluca and Michoacan on one side, and between the table-land of Mixtecapan on the other, and the uneven plain of Xalisco, are called Tierras Templadas. Their mean annual temperature amounts to between 75° and 78°, and they enjoy nearly a continual spring, as the difference of the temperature in the colder and hotter season does not exceed 8°, or at the utmost 10°. These tracts produce the tropical fruits and the sugar-cane in abundance; and, as well as the table-lands themselves, enjoy a very healthy climate all the year round, whilst the inhabitants of the low tracts along the coast are subject to dangerous diseases.

We pass to the countries lying to the north and east of the Sierra Madre. The country, which is bordered by this range on the south and west, is a plain of great length, terminating on the north on the banks of the Rio del Norte, betwcee 30° and 32° N. lat., and at the Sierra de las Espuelas, the most northern offset of the Sierra Madre. Its length is nearly 700 miles. Its width, which between 22° and 24° N. lat. hardly exceeds 100 miles, widens considerably farther north, so that at 29° N. lat. it is probably more than 300 miles. The southern portion of this plain, as far north as a line drawn from Zacatecas on the west to Catorce on the east, may be on an average about 6000 feet above the sea-level. Its surface is in many places traversed by ranges of hills, running east and west, and its soil in general resembles that of the plain of Queretaro, but is not equal to it in fertility, a great portion of it being covered with sand, and other parts with stones. Some districts, being possessed of the means of irrigating the land, are distinguished by fertility, as the country about S. Luis de Potosi, and the Valle del Maiz, which lies on the banks of the Rio Tamoin, a tributary of the Rio Panuco. A great portion of the country serves as pasture-ground for numerous herds of cattle, sheep, and goats. The rains are less abundant than farther south, and fall mostly in October and November; the heat in summer is less and the cold in winter greater than on the table-land of Queretaro.

The northern portion of the plain is still less favoured by nature. Near a line drawn from Zacatecas to Catorce it is about 6000 feet above the sea-level, but in the neighbourhood of the Rio del Norte probably not more than 3000 feet. It suffers greatly from the scarcity of rain, which in the southern districts is far from being abundant, and north of 27° N. lat. is very rare. It is consequently badly supplied with water, the springs being few in number, and the water of a very disagreeable taste. This latter circumstance is principally owing to the soil, which contains a great portion of carbonate of soda. The plain contains numerous dry salt-lakes, whence large quantities of carbonate of soda are collected and taken to different parts of the republic for the manufacture of soap. All the rivers which water this plain rise along the eastern declivity of the Sierra Madre, and running northward, are lost in some lake having no communication with the sea, with the exception of the Rio Conchos, which rises with several branches between 26° and 28° N. lat., and falls into the Rio del Norte near 31° N. lat. In the southern districts are the Rio Grande de las Nieves, which runs about 300 miles, and loses itself in the lake of Parras, and the Rio Nasas, which after a course of about 200 miles enters the lake of Mapimi. In the northern districts are the Rio de S. Buenaventura, and the Rio de las Casas Grandes, which run hardly more than 100 miles, and fall into the lakes of S. Maria and of Guzman. The cultivable land of this plain is limited to the river bottoms, which extend from two to four miles along the banks, and produce Indian corn and other grain. In the valley of the Rio Nasas much cotton is grown, and in the neighbourhood of the lake of Parras are extensive vineyards, from which a good wine is obtained. All the extensive tracts which separate the river bottoms from one another are level, and consist mostly of a firm soil, the sandy or stony tract being rare and of comparatively small extent; but they are quite destitute of wood or even shrubs, and in certain seasons even dry grass is rare. Gales of wind are very frequent, and from whatever point of the compass they blow, they are very cold and raise immense clouds of dust filled with saline particles. The last-mentioned circumstance is considered as the cause of the insalubrity of this region. Within this plain is situated a mountainous region, called the Bolson di Mapimi, which occupies the tract of land extending from the northern shores of the lake of Mapimi to the banks of the great southern bend of the Rio del Norte. But its extent to the east and west is imperfectly known. It is in possession of an unsubdued

tribe of natives, called the Appaches, and has never been examined by European travellers, but it is said to contain an abundance of metals, which have never been worked.

The Sierra Madre, which extends along the western side of this plain in a north-western direction, lowers towards it with a gradual descent, or, more probably, in terraces, separated from each other by abrupt declivities, and traversed by deep and steep transverse valleys. The crest of the chain is situated towards its western declivity, and between the ridges which compose the mountain-region are longitudinal valleys, narrow, but of considerable extent, which contain rich mines. Towards the plains, which lie along the Pacific, the descent is very rapid, and only furrowed by ravines.

The country between the Sierra Madre and the Pacific is naturally divided into two different regions, the plains of Cinaloa and the hilly region of Sonora. The former extends between 24° and 28° N. lat., and the latter between 28° and 32° N. lat. The plains are perfectly level, and only hills of moderate elevation divide them from the Sierra Madre. Their soil consists of a sandy clay, almost without a pebble, which is fertile wherever it is irrigated; but as this country has not been in possession of the Spaniards much more than a century, agriculture has not yet made much progress. The rains set in regularly on the 24th of June, and last about two months. The greatest heat is experienced before the rains, from the month of March, when the country is parched up and resembles a desert. The rivers running across the plain flow in beds considerably below its surface, and it does not appear that even after the most abundant rains they rise high enough to water the adjacent tracts. The most considerable of these rivers are the Rio de Culiacan, the Rio del Fuerte, and the Rio Mayo, each of which may run upward of 100 miles in a wide and deep bed. The greater part of the plain seems to be considerably elevated above the sea, as there is a sensible descent some miles in length from it to the low and sandy tracts which skirt the shore.

Sonora, which begins at some distance north of the Rio Mayo, has likewise a tract of level and low land along the sea, but it soon rises to some elevation, and then extends nearly on a level many miles inland. This part of the country is rather sterile, but more from want of moisture than from want of good soil, which resembles in every respect that of the plain of Cinaloa. The hilly country begins from 30 to 40 miles from the shore, and is traversed by several ridges running south and north, parallel to the Sierra Madre. It is not yet known how they are connected with the principal mountain-chain. In some places the hills rise to the height of mountains, but their elevation has not been ascertained. Between these hills run rivers in valleys, generally several miles wide, and possessed of a considerable degree of fertility. The largest is the river Yaqui, which is formed by two branches; the Rio Babispe, flowing along the base of the Sierra Madre southward, and the Rio Oposura, which runs parallel to it farther west. The first runs about 200 miles, and the second 120 miles, before they unite upon emerging from the hilly region. After their junction they take the name of Rio Yaqui, and flow about 150 miles more, until they fall into the Gulf of California, south of 28° N. lat. The central districts of Sonora are also traversed from north to south by the rivers Arispe and Dolores, which flow parallel to each other until they unite a few miles above the town of Pitic at S. Jaunitz; a few miles below Pitic the united river enters a lake of some extent, which has no communication with the sea. The whole course of this river may be about 200 miles. In the northwestern corner of Sonora is the Rio de S. Ignacio, which runs more than 100 miles, and is likewise lost in a lake. None of these rivers are navigated, but they are used to irrigate the valleys, in which maize and wheat are grown to a considerable extent. Without this irrigation the country would be a desert, as the rains, which come in September, do not last more than four weeks, fall only in short showers, and are very irregular and uncertain. It would seem that in the most northern district there is no rain at all. As this part of the Mexican States is situated within the temperate zone, it partakes of the great changes in temperature which commonly occur in these countries. The thermometer ranges during the year between 30° and 95°. During the northern and north-eastern winds, which blow from the Rocky Mountains, and probably pass over elevated plains, it sometimes freezes every night for several weeks at Pitic (29° N. lat.), and the thermometer then sinks as low as 18° in the night-time. It seems that frost occurs in these parts every year. But the summer is excessively hot, and the hot weather continues for several months: the rains take place much later here than farther south.

The countries hitherto described are situated on the Mexican isthmus, which is divided from the main body of North America by a plain extending from the shores of the Pacific eastward to the lower course of the Rio del Norte, between 32° and 33° N. lat. This plain seems to be interrupted by two mountain-groups only: one of them, the Arizona, is situated near 109° W. long., and noted for the fabulous stories of its great wealth in the precious metals; the other occurs near the bank of the Rio del Norte, where the river begins to flow in a south-south-eastern direction, and is called Sierra del Florido. Nothing is known of these mountain-groups. The plain is drained by the river Gila, which runs more than 500 miles in a western direction, and unites with the Rio Colorado near its embouchure in the Gulf of California. It rises in the Sierra de Mogollon, the most southern extremity of the principal range of the Rocky Mountains; and though it may have a considerable volume of water in its upper course, it loses it imperceptibly by flowing through an arid plain of great extent, in which not a drop of rain falls during the whole year, and in which it does not seem to be joined by any tributary of importance. The plain itself is a desert, in which only a few families of the Appaches lead a wandering life. An exception however is to be made in favour of the district where the extensive ruins called Casas Grandes (near 110°) are found, as such ruins generally occur in spots favoured by natural fertility.

The Mexican States extend much beyond this natural boundary, and comprehend a considerable portion of the mainland of North America, namely, the two Californias; the unknown region extending between Upper California and the Rocky Mountains; the Vale of the Rio del Norte, or New Mexico; and Texas, or the country extending east of the Rocky Mountains to the boundary-line of the United States of America. As to the Californias, see CALIFORNIA, vol. vi., p. 158. Of the country lying north and east of Upper California little is known: two lakes of great extent are stated to occur in it, of which one is said to be salt. The reports of the monks respecting this wide tract are mentioned in the article COLORADO. We shall conclude our survey with New Mexico and Texas.

New Mexico is a valley of great extent, included by the two mountain-ranges with which the Rocky Mountains terminate on the south. The western range, called Sierra de Mogollon, commences about 34° N. lat., and is in the plain which lies along the upper course of the Rio Gila. It is not known if this range is connected with the Sierra del Florido, which is about 80 miles south-south-east of it. The other range, called Sierra del Sagramento, rises farther east, opposite the mountain-region called the Bolson de Mapimi, in the most southern bend of the Rio del Norte, near 29° N. lat., and extends northward to 40° N. lat., where it joins the Sierra de Mogollon. Both ranges run nearly parallel to one another, from 34° to 40° N. lat., and the long longitudinal valley between them is New Mexico. Its southern district, between 34° and 35° 30′ N. lat., is a desert, covered with arid hills, which come close up to the banks of the river, and are nearly without vegetation, except in some narrow valleys traversed by rivulets. This district is called Deserto del Muerto. The northern district, between 35° 30′ and 38° N. lat. is a valley, from 20 to 40 miles across: this part has been settled, and produces grain enough for the consumption of the population. But the greatest wealth of the people consists in their pasture-grounds, which feed numerous herds of sheep, their plantations of tobacco, and the wild animals which inhabit the adjacent mountains. The most northern part of the valley, between 38° and 40° N. lat., is uninhabited, probably on account of the severity of the climate, which even in the settled part is so great that the Rio del Norte, though a rapid river, is annually covered with ice for several months. This circumstance is partly to be attributed to the ranges enclosing the valley, which in some places are covered with eternal snow, but chiefly to the elevation of its surface, which Humboldt thinks cannot be less than from 2000 to 2500 feet, an estimate probably rather below than above the truth. Rain is very scarce and usually falls only once a year, and in some years no at all; the snow however, which covers the ranges to the

month of June, supplies the soil with the moisture requisite for the growth of grain and grass.

The Rio del Norte, also called in its lower course Rio Grande, and on the maps incorrectly Rio Bravo, is the largest of the rivers of Mexico. Humboldt estimates its course at nearly 1400 miles. It rises in the most northern angle of the Vale of New Mexico, near 40° N. lat., not far from the sources of the Arkansas, a tributary of the Mississippi, and of the Rio Colorado, which falls into the most northern recess of the Gulf of California. The Rio del Norte runs southward from 40° to 29° N. lat., and even in the vale of New Mexico is a considerable river, which has water enough for small boats, but is not navigated. In the mountains between 35° 30′ and 34° N. lat. it seems to be too full of rapids to permit of any kind of navigation. Where it enters the plain, south of 34° N. lat., its waters are abundantly used for irrigating the fertile district which surrounds the Passo del Norte, and its water is considerably diminished. Afterwards it receives a small supply of water by the Rio Conchos: and after having changed its course by a great bend to the east and north-east, it receives a larger supply by the Rio Puerco, which runs in a longitudinal valley east of the Sierra de Sagramento; but as its course lies through an arid plain, which is rarely refreshed by abundant rains, the volume of its waters is too small even for small craft, until it has changed its course to the south-east, and has arrived at the Presidio de Rio Grande, about 200 miles from its mouth. At this place or in its neighbourhood, as it seems, the river leaves the elevated plain and descends into the lower country which extends along the shores of the Gulf of Mexico, and from this place downward it may be navigated by small boats. The waters of the Rio del Norte rise, as those of many other rivers, annually: this rise begins in the month of April, is highest in May, and at the end of June the waters attain their greatest height. This change is owing to the melting of the snow on the surrounding mountains. The rise of the water is not perceptible in the lower course of the river. The mouth of the river is south of 26° N. lat., at Braxos de Santiago, and about twenty miles below Matamoros, to which town vessels of small burden may ascend: but larger ones cannot enter the river on account of its bar and of numerous shoals.

The country east of the Sierra del Sagramento, and north of the lower course of the Rio del Norte, which is comprehended almost entirely under the name of Texas, differs greatly in its natural features from all other parts of the Mexican States. That portion of it which lies along the Sierra del Sagramento and extends eastward to 102° W. long. is considerably elevated above the sea, probably not less than 2000 feet. Its northern portion, embracing the country on both sides of the Red River as far north as the Arkansas, is an extensive plain, considerably elevated above the watercourses, along the course of which are bottoms of moderate extent, covered with trees of heavy growth, which indicate a considerable fertility of the soil; but the spaces between these river-valleys have an arid though commonly a firm soil, which is covered with vegetation only in the early season of the year, and on the approach of summer is deprived of it. Like the extensive plains along the base of the Rocky Mountains, it wants water and wood, and seems to be incapable of cultivation. This region is joined on the south by an extensive tract of mountainous country, called the hills of San Saba, which is connected with the Sierra del Sagramento, and extends southward to the mouth of the Rio Puerco. Its eastern offsets extend to the meridian of 100°. The mountains probably do not rise above their base more than 2000 feet; but this is only a supposition, as the whole region, being in possession of a tribe of natives, the Comanches, who are enemies to the white settlers, is unknown. In this mountain-tract most of the large rivers that water Texas take their origin. Between this region and the elevated plain on the Red River a salt swamp of great extent is stated to exist, in which one of the branches of the Rio Brazos rises. When the salt, which crystallizes on its surface after long dry weather, is dissolved by abundant rains, the water of the Rio Brazos becomes brackish.

The remainder of Texas, included between the meridian of 100° N. lat., the Red River on the north, the Sabine on the east, and the Gulf of Mexico and Rio del Norte on the south, is considered one of the most fertile countries of North America. The coast is low, and skirted by a number of long flat islands, separated from the main by narrow straits; but these straits are much deeper than those farther south, and afford in several places good anchoring ground for vessels of moderate size; so that Texas has more and better harbours than all the Mexican States on the Gulf of Mexico taken together. The bars on the rivers have deeper water on them, probably because their course is less rapid and their waters less troubled, as they do not descend from countries at a great elevation above the sea-level.

The low country along the coast extends about ten or twelve miles inland; it is not, like the country south of the Rio del Norte, a sandy desert without vegetation, but suffers rather from superabundance of water, being a great part of the year inundated or in the condition of a swamp. Behind this low swampy tract the country rises imperceptibly for some miles, and then appears to stretch out in a wide plain with a nearly level surface. The width of this plain varies considerably, as its northern and western borders form nearly a crescent. Near the boundary-line of Louisiana it is from 40 to 50 miles wide. At the north-western corner of the Gulf of Mexico, between the rivers Trinidad and Guadalupe, its width is stated to be 70 or 80 miles; but on approaching the Rio del Norte it narrows to 20 or 25. This plain is from 10 to 30 feet above the water-courses, and with the exception of the low bottoms along the banks of the rivers, it is not subject to inundation. The tide, though it varies only from two to three feet, ascends the rivers to the distance of 45 or 50 miles from the sea in a straight line. The whole of this plain is wooded, with the exception of the highest tracts of land between the rivers, which are destitute of trees, and exhibit fine prairies. The forests consist of different kinds of oak, hickory, iron-wood, sugar-maple, and other useful trees, which are found in the southern states of the American Union. It is supposed that the whole of this tract might be cultivated and changed into an immense field, producing cotton, sugar, Indian corn, tobacco, wheat, and every kind of plants and fruit-trees which grow in the temperate zone and on the borders of the tropics, whilst the prairies, which hardly occupy one-fifth or sixth of the region, would, in their natural state, serve as pasture-ground for cattle.

The country at the back of this plain is less favoured by nature, the proportion between the cultivable land and the prairies being nearly inverted. The former is chiefly limited to the bottoms of the rivers, which are numerous, and generally wide, so that they perhaps occupy one-fourth of the surface. Their soil is alluvial, and in the present state covered with trees of large growth, a certain indication of great fertility. As the rivers are not impeded in their course, and have sufficient fall to draw off the superabundance rapidly, the inundations are of short duration, and serve only to impart new vigour to the soil. The country between these bottoms generally rises from them with a gentle acclivity to an elevation of 200 to 400 feet, and presents for the most part an undulating surface, on which isolated hills of moderate elevation are dispersed. By far the greatest part of this tract is destitute of trees, which occur only in isolated clumps, and at considerable distances from one another. The most extensive of these wooded islands cover the bases and declivities of the hills. The remainder of the country is covered with grass, which affords excellent pasture. As the grass maintains its verdure for many months, it appears that the soil is less arid and destitute of moisture than farther north, or on the table-lands of Mexico, and it is thought that extensive tracts of it may be cultivated with wheat or other grains. The least fertile district of this tract occurs about the sources of the Sabine river, where the country rises into hills, covered with a light sandy soil and overgrown with pine-forests. It resembles that part of Louisiana which lies between the Red River and Arkansas west of Natchitoches.

Texas owes its great capability for agricultural purposes to its numerous rivers and the regularity of their course. These rivers, when the country shall be well settled and cultivated, will materially contribute to its prosperity, as all of them, even those which run only fifty miles, are navigable for small craft in the greatest part of their course. The most remarkable of these rivers from west to east are—the Rio Nueces, which flows about 250 miles with a general south-eastern course; the Rio Guadalupe, which is nearly as long, and which falls into a lagune forming the harbour of Espiritu Santo; the Colorado, which traverses in its upper course the mountain-tract of San Saba, flows upwards of 400

miles, and falls into the lagune constituting the harbour of Matagorda; the Rio Brazos, or Brazos de Dios, whose origin is near to that of the Red River, and which, flowing chiefly in a south-south-easterly direction, intersects nearly the centre of Texas and the most fertile districts. It enters the sea after a course of more than 400 miles, forming at its mouth a harbour, with a bar on which only from three and a half to five and a half feet of water are found. The Rio Trinidad, after a course of more than 300 miles in a south-south-easterly direction through a very fertile tract, falls into Galveston Bay. As to the Red River and Sabine River, which separate Texas from the United States of North America, see LOUISIANA.

Productions.—As there is so great a difference in the climate of the different regions of Mexico, there must be a corresponding variety in their productions. Humboldt asserts that within these states almost all the vegetable productions may be grown which are found between the equator and the polar circle. The agricultural productions which actually are grown prove the justice of this observation. On the highest of the table-lands, that of Toluca (9000 feet) wheat does not succeed, nor does it succeed in Europe beyond 60° N. lat. On this table-land agriculture is limited to the cultivation of barley and the plantations of the American aloe, which may be considered as the vineyards of Mexico, the juice of this plant being converted into a kind of wine, called *pulque*. [AGAVE.] It is however remarkable that Indian corn grows on this table-land, a circumstance which shows the difference in the climate of countries which have a great elevation above the sea, and those in which it depends on geographical position only. Most of the table-lands however are from 6000 to 7500 feet above the sea; and as their climate may be compared with that of the southern countries of Europe, we find that they produce all the cerealia of Europe, with the exception of oats, which are not used, as horses in Mexico are fed on barley. The fruits also are those of Europe, as cherries, peaches, plums, apricots, apples, pears, figs, and pomegranates. The vegetables too are those of Europe, among which capsicum, called *chile*, is most abundantly grown, as it is used all over the country nearly as salt is in Europe. The plantations of American aloes on these table-lands are also very extensive. The difference between the agricultural productions of the Tierras Templadas and Calientes is not well established. Maize is grown everywhere, and constitutes the principal food of the lower classes; and it is the only grain which is cultivated for food, rice being only grown to a small extent in the wet countries along the Rio Huasacualco. But the plantations of plantains and those of manioc are extensive; and besides these, Oxalis tuberosa, Dioscorea alata, and batatas are cultivated on a large scale. Oranges and lemons, which do not succeed on the table-land, are abundant in the Tierra Templadas: and besides these, many fruits of hot countries, especially pine-apples, guavas, and others.

The agriculture of the table-lands does not supply any article for exportation. Cotton is grown along the shores of the Pacific, and in the valley of the Rio Nasas, in a deep depression of the northern table-land; and coffee on the eastern coast, west of the town of Vera Cruz; sugar is cultivated in many places, and a considerable quantity is exported; cocoa is collected in the low country along the river Huasacualco; and indigo along the southern coast, but only for home consumption. Tobacco, which in many parts succeeds very well, is only permitted to be grown in certain places, as government, which derives a considerable income from a heavy duty laid on its consumption, has limited the cultivation to certain spots to prevent all evasion of the tax. Three plants grow wild in the forests, at the base of the steep ascent which divides the low eastern coast from the table-lands, and supply articles of export—the jalapa, sarsaparilla, and the vanilla.

All the domestic animals, which have been brought over from Europe by the Spaniards, have multiplied greatly in Mexico, owing to the wide tracts which are not or cannot be cultivated, and which afford pasture-ground for nine or ten months of the year. Cattle is abundant, both on the table-lands and the lower tracts; among the latter, especially on the wet plain of Tabasco and the arid plain of Yucatan. Jerked beef and horns are exported. Sheep are numerous on the table-lands, especially on the northern, which are much drier; and wool is an article of exportation. Horses abound generally, and in the north-eastern provinces a great number are found in a wild state: they are easily taken and broken in. Horses and mules are exported in great numbers to the United States. On the great plains bordering on the Red River and Arkansas the American buffalo abounds. In winter the buffaloes traverse the hills of San Saba, and pasture on the plains along the lower course of the Rio del Norte. Carnivorous wild animals are not numerous. Game is abundant, especially deer and hares. Among the birds are various kinds of parrots, mackaws, and humming-birds. The lakes abound in fish. Bees seem to abound on the peninsula of Yucatan, and the cochineal insect is reared with great care on the table-land of Mixtecapan, whence by far the greatest part is brought to the market of the world. In the Gulf of California pearl shells are found, and formerly many pearls were collected, but it seems that this branch of industry has declined.

Mexico is noted for its mines of gold and silver. The gold-mines occur chiefly on the western side of the Sierra Madre, north of 24° N. lat.: the silver-mines are richest on the mountains which rise on the table-lands, and in those which border their margin. During the civil war, which began in 1810 and lasted for many years, the greatest part of the mines were neglected. Their working was however renewed in 1825, chiefly by the English mining companies which sprung up about that time. Before that event (from 1810 to 1825), the produce was much less than it had been before 1810. Since the year 1825 it has considerably increased, though not so much as was expected. Besides the precious metals, Mexico has abundance of copper, iron, and lead, which are worked. The iron-mines however have only been opened since the year 1825. A quicksilver-mine is worked at S. Onofre, on the northern declivity of the Sierra Madre, in the state of Queretaro. Tin is also stated to exist. The carbonate of soda, called *tequesquite*, which is necessary for the smelting of the silver ore, is collected in several lakes, where it is found crystallized on the surface in great abundance. It is also common in most places of the table-land in the upper layers of the soil, where it appears in the state of an efflorescence in the month of October, after the rains have ceased.

Inhabitants.—The population of these states is composed of creoles or descendants of Europeans, of Indians or natives, and of those of mixed blood. The number of Europeans, who are called *Gachupines*, and formerly amounted to 80,000 individuals, has been much reduced by the expulsion of the natives of Spain; and though many individuals of other nations, especially Englishmen, have settled in these states during the last twenty years, it is supposed that the whole number of Europeans hardly amounts to more than 20,000 or 25,000.

The bulk of the population still consists of the descendants of those nations which inhabited the country at the time of the Spanish invasion. Humboldt thought that they constituted two-fifths of the whole population; but as he asserts that no natives were mixed up with the white population in Sonora, where modern travellers have found that they really constituted more than half the number of the inhabitants, it is probable that the natives form one-half of the whole population, especially if we take into the account the numerous tribes which occupy the large tract of unknown country between Upper California and the vale of the Rio del Norte, and which are computed to amount to 300,000 individuals; though this number is probably exaggerated.

The aboriginal tribes of America resemble one another in the principal features of their face and body, which, according to Humboldt, are the following: the colour of their skin approaches that of copper; their hair is black, lank, and so smooth, that it always appears as if it had been wetted; and they have little beard. Their figure is rather short and stout; their eyes small, long, and a little raised towards the temple-bones, as in the tribes which belong to the Mongol race. Their cheek-bones are prominent, their lips thick, and their mouths exhibit an expression of softness, which forms a strange contrast with the rigidity of their looks. Though they thus greatly resemble one another in personal appearance, the tribes into which they are divided speak languages which are said to differ as far from each other as the English from the Russian. Humboldt states that twenty languages of this description were spoken within the territories of the states south of 33° N. lat.; but it would seem that he has not comprehended in this number the eight nations which live

within the boundary of Sonora, or the northern portion of the state of Occidente. The number of tribes which are still entirely independent, and live north of 33° N. lat., is not known, and seems to be very great. The language which is most extensively spoken is that of the Azteks, which seems to be understood by nearly all the tribes which inhabit the country between 18° and 23° N. lat. The language of the Otomites, which is spoken in the countries along the Pacific between 20° and 24° N. lat., is remarkable for its structure, which resembles that of the Chinese language, being composed of monosyllables. (Naxera, *De Lingua Othomitorum Dissertatio*, Philad., 1835, and *London Geographical Journal*.) Next to the language of the Azteks, that of the Otomites is the most widely spread.

The natives who have submitted to the dominion of foreigners have attained different degrees of civilization. Those who inhabit the country between 18° and 23° N. lat. were, on the arrival of the Spaniards, subjects to the kings of Tenochtitlan and Michoacan, or united in the republics of Tlaxcallan (Tlascala), Huexochingo, and Chollollan, and had then attained a considerable degree of civilization, as is proved by the ruins of their religious buildings, or *teocallis*, their causeways and dikes, their hieroglyphics, paintings, and sculptures; and though the objects of their agriculture were only few in number, their cultivation was extensive, and carried on with considerable care. They submitted to the conquerors, and continued to cultivate the ground on which they were born. Their present condition is not worse than that of the lower classes who cultivate the ground in most parts of the European continent, but they appear to have fewer wants, and accordingly indulge more in indolence. Among them are some very rich families, but they are not distinguished by their mode of life or their dwellings from the other members of their tribe. In most places they live mixed with the whites and metis; in others they occupy large tracts, to the exclusion of all foreigners. The countries north of 24° N. lat. were inhabited at the time of the conquest by tribes resembling those of the United States of North America. They had no fixed dwellings, and lived mostly on the produce of the chase; and as this produce could not be abundant in countries whose vegetation is so scanty, and which are destitute of trees, their numbers were small, and they speedily retired from the large plain east of the Sierra Madre to the mountain tract called the Bolson de Mapimi, where they still continue their savage life. They have also disappeared from the plain which extends along the Pacific to the Rio Mayo. In these two plains a few natives are only found along the southern boundary-line, and these seem to have settled there since the conquest. But in the hilly tract north of the Rio Mayo the natives resisted the invasion of the Spaniards, and were only subjected by the Jesuit missionaries. The padres accustomed them to a civilised life, and taught them the principal mechanic arts: their success here was hardly inferior to that which they had in the famous missions of Paraguay. Though these Indians inhabit the same country with the numerous white families which have spread among them, they live in separate places, and no close intercourse exists between them, except for the purposes of trade. In the arts of domestic life they seem to approach nearer to the Europeans than the Azteks, and they certainly exhibit a greater degree of energy and mental power than the last-mentioned nation.

The *Indios Bravos*, or savage tribes, inhabit the countries north of 33° N. lat., along the Rio Gila, the Bolson de Mapimi, the mountain-ranges which include the vale of the Rio del Norte and the north-western district of Texas. Many of them, especially the Appaches and Comanches, the most numerous of the tribes, were and still are at open war with the white settlers. For the protection of the latter the Spaniards erected presidios: a presidio consists of a wooden wall of a quadrangular form, within which the houses are built, and the gates are shut at sunset. They are inhabited by a few white families and a small number of soldiers for their protection. The inhabitants of the presidios cultivate the adjacent grounds, and keep large flocks of cattle and sheep, but do not venture to pass the night without the walls. The Indios Bravos generally live on the produce of the chase, and are most numerous in the tracts which are visited by the buffaloes. It does not seem that they cultivate the ground. Where the states of Yucatan and Tabasco border on Central America there is still an independent tribe, the Mayas, who speak a language different from that of the Azteks, and have made some progress in civilization: they cultivate maize, cocoa, and tobacco, and clothe themselves with cotton and the bark of the India-rubber trees, but they still depend principally on fishing and hunting for their support.

The mixed race is mostly composed of the descendants of Europeans and the aboriginal tribes: these are called *Metis*, or *Mestizos*, and constitute more than one-fourth of the population. The descendants of Africans and Indians, and of Africans and Europeans, are much fewer. The former are called *Zambos*, and the latter *Mulattos*. In the neighbourhood of Acapulco there are a few Chinese and Malays, who have emigrated from Asia. There are very few negroes in this country.

The whole population, which probably at present considerably exceeds seven millions, is composed of these different elements, according to a rough estimate, in the following proportions:—

Aboriginal nations . .	3,500,000
Mestizos . . .	2,000,000
Mulattos and Zambos . .	600,000
Creoles, or descendants of Spaniards	1,200,000
Europeans . . .	25,000
	7,325,000

Political Division and Towns.—The confederation called the United Mexican States consists of nineteen republics or states, besides three territories, and an immense tract of country which has not been annexed to any of them. According to an estimate, the states contain the following number of inhabitants and extent in square miles:—

	Population.	Extent in sq. miles.	Number of Inhabitants on a sq. mile.
1. Chiapa . .	130,000	38,500	4
2. Yucatán . .	520,000	48,500	11
3. Tabasco . .	55,000	10,500	5
4. Oaxaca . .	600,000	34,500	17
5. Vera Cruz .	250,000	22,000	11
6. Puebla . .	820,000	21,000	39
7. Mexico . .	1,200,000	30,000	40
8. Michoacan .	450,000	26,500	17
9. Xalisco . .	800,000	74,500	10
10. Guanaxuato .	450,000	8,600	52
11. Queretaro .	230,000	15,500	15
12. S. Luis de Potosi .	220,000	17,500	13
13. Zacatecas .	275,000	18,500	15
14. Durango .	200,000	56,500	4
15. Occidente .	180,000	148,000	1¼
16. Chihuâhua .	120,000	72,500	1¼
17. Cohauila with Texas	46,000	136,500	⅓
18. Nuevo Leon .	85,000	20,000	4
19. Tamaulipas .	60,000	40,000	1½
	6,691,000	833,600	8

To these the territories are to be added:—

	Population.	Extent in sq. miles.	Number of Inhabitants on a sq. mile.
1. The territory of Santa Fé, or New Mexico	45,000	45,000	1
2. Territory of Lower California .	4,000	30,000	¼
3. Territory of Upper California, comprehending the whole country north of the Rio Gila, and between the Pacific and the mountains, including the vale of Rio del Norte	325,000	600,000	
	374,000	675,000	

1. The state of Chiapa, called also Las Chiapas, comprehends the whole of the western declivity of the table-land of Guatemala, as far as it belongs to the Mexican States,

and a portion of the plain of Tabasco, the river of that name forming for a considerable distance the boundary-line between Chiapa and Tabasco. Though its soil is in general fertile, and the climate favourable to the growth of tropical productions, it does not appear to contribute any article to commerce, except logwood, which is floated down the rivers Usumasinta and Tabasco to Villa Hermosa. Near the banks of the Rio Chacamas, a tributary of the Usumasinta, are the ruins of Palenque, in a country which at present is a desert overgrown with trees. They are stated to extend for more than twenty miles along the summit of a ridge, and, as far as can be inferred from their architecture, they seem to owe their origin to a people more resembling in taste the Europeans than the Azteks. This state formed a part of Central America up to 1825, when it was united to Mexico, without the republic of Central America having renounced its claims on it. The capital is Ciudad de las Casas, formerly Ciudad Real, in a very fertile country, with about 4000 inhabitants. It has a college for Catholic clergymen, and a monument has been erected here to the famous Las Casas, the protector of the Indians, who was bishop of this province, and died in 1566. Some other places are still more considerable: as Chamula, with 6000 inhabitants; S. Bartolomeo de las Llanos, with 7500 inhabitants; Commitan, with 6000 inhabitants; and Tuxtla, with 4500 inhabitants.

2. The state of Yucatan comprehends the peninsula of that name as far south as 18° N. lat. It exports much campeachy-wood and fustic, which grow mostly on the eastern coast, and also on the western, south of 20° 30′ N. lat., and also a considerable quantity of bees-wax. The Mayas, who live in a state of independence, occupy its southern district. The rivers Champoton and Pacaitun are navigable, for small craft, for many miles inland. The capital is Merida, with 28,000 inhabitants, situated on an arid plain about twenty-five miles from the sea. It carries on a considerable commerce by means of the harbour of Sizál, which is properly only a roadstead formed by a sand-bank called Bajo Sizál, twelve miles long. Farther east is Valladolid, with a population of 3000 inhabitants, in a district in which much cotton is grown. On the eastern coast is Salamanca de Bacalar, with 2000 inhabitants, whence much mahogany and fustic are shipped to Belize. On the western coast is Campeachy [CAMPEACHY], and a number of populous villages inhabited by Indians.

3. The state of Tabasco extends over the greater part of the low plain, from the lake of Terminos on the east, to the Rio de Huasacualco on the west. It is traversed by the Rio de Tabasco. It exports cocoa, coffee, Tabasco pepper, indigo, and vanilla. The capital is Villa Hermosa, also called San Juan Bautista, on the river Tabasco, about fifty miles from the sea, to which place vessels of moderate size may ascend the river. It carries on some commerce, and contains 8000 inhabitants.

4. The state of Oaxaca extends over the whole of the table land of Mixtecapân, and is rich in agricultural products: the industrious inhabitants rear the cochineal-insect and the silkworm, and apply themselves to the cultivation of indigo. It has some mines of gold and silver in the mountain-ridge which separates it from the low plain of Tabasco, but they do not appear to be rich. This state contains several antiquities, among which are the ruins of the palace at Mitla, which differ from the ruins of the edifices erected by the Azteks, and approach in style nearer to those of Greece. They lie on the table-land, 5300 feet above the sea. The capital, Oaxaca, which contains 40,000 inhabitants, is built in a depression of the table-land, 4800 feet above the sea-level. It is well-built, has fine houses, squares, and aqueducts, and contains some manufactures of sugar, chocolate, and silk. Tehuantepec is situated about ten miles from the sea, on a plain on which indigo and cocoa are grown, and salt collected in the lagunes which skirt the sea. It contains about 7000 inhabitants, and carries on some commerce by the harbour called Ventosa, or Tehuantepec Road, which is only an open roadstead, but has good anchorage.

5. The state of Vera Cruz comprehends the whole coast of the Gulf of Mexico, from the river Huasacualco on the south-east, to that of Panuco on the north-west, and, in some parts, extends over the mountains which border the table-lands on that side. Accordingly it exhibits a great variety in climate and vegetation: its most elevated parts are covered with pine-forests. Within its boundary-line are situated the Peak of Orizava, the Coffre de Perote, and the small volcano of Tuxtla. Its commercial products are sugar, coffee, jalap, sarsaparilla, and vanilla. Tobacco is extensively grown. In the northern districts of this state, in a forest near the village of Papantla, is a pyramid built of hewn blocks of porphyry, which are worked with great care and skill. The capital is Vera Cruz. [VERA CRUZ.] Alvarado, about three miles from the mouth of the Rio Alvarado, is a small town, which however carries on some commerce, its port being good, of sufficient space and depth, and well defended from the winds; but the bar at the entrance of the river does not admit vessels that draw ten feet of water. The harbour of Huasacualco, at the mouth of the Rio Huasacualco, has still less water, and is little frequented. At the most northern extremity of the state is the town of Tampico, or rather Pueblo Viejo de Tampico, built on the border of a large shallow lake, the Laguna de Tamiagua, which communicates with the Rio Panuco near its mouth. It contains about 4000 inhabitants, and is ill-built. It carries on a considerable commerce, which however has lately decreased since the new town, called Pueblo Nuevo de las Tumaulipas, has been founded on the northern side of the river, about three miles from it. In the interior of the state are the towns of Cordova and Orizava, built near the base of the steep ascent, each containing about 3000 inhabitants; in their neighbourhood much tobacco and coffee are grown. On a level spot, situated on the steep ascent, is the town of Xalapa, or Jalapa, 4335 feet above the sea-level, in a very beautiful country: it contains 13,000 inhabitants. To this place the merchants of Vera Cruz retire when the vomito prieto is raging along the coast.

6. The state of Puebla comprehends by far the greatest portion of the table-land of Tlascala, and also a considerable portion of the lower but very hilly country, which extends to the Pacific, between the table-land of Mixtecapân and those of Tenochtitlan and Michoacan. It contains the elevated peaks of the Popocatepetl and Istaccihuatl. Near the town of Cholula are three remarkable antiquities. [CHOLULA.] The western and southern districts are fertile and well cultivated. In the country about the capital great quantities of carbonate of soda are collected; but this state does not produce any article for exportation. Puebla, the capital, formerly called Puebla de los Angelos, is built in a well-cultivated plain, on the south side of a hill which is wooded to its summit. The houses are all of stone, large, and commodious. The churches and convents are very numerous, and generally well-built. The cathedral is considered the finest and most magnificent edifice in the whole republic, and very rich. The town contains between 50,000 and 60,000 inhabitants; it has some manufactures of cotton, wool, and earthenware, which however have greatly declined since the commerce of Mexico has been thrown open. Its trade with the neighbourhood is considerable. South-east of it is the town of Tehuacan, which is stated to contain a population of 10,000. North and north-east of Puebla are the towns of Tlascala (4000 inhabitants) and Huamantla (3000), whose inhabitants, with those of the country about it, enjoyed some privileges before the revolution. For a notice of Cholula see CHOLULA.

7. The state of Mexico comprehends the two table-lands of Tenochtitlan and Toluca in all their extent, the north-western part of the table-land of Tlascala, and a considerable part of the lower but much more hilly country, which lies to the south of the two first-mentioned table-lands, and extends from them to the Pacific. The river Bolsas drains its southern districts, and the Rio Santiago rises in the north-western, under the name of Rio de Lerma: not far from the morass, in which it takes its origin, is the Nevado de Toluca. Though nearly all the productions of the tropics, together with those of the temperate zone, might be grown in the different regions belonging to this state, none of its agricultural productions supply an article for exportation; the sugar cultivated in the plain of Cuantla y Amilpas, south of the table-land of Tenochtitlan, and in some other places, to a considerable extent, is consumed in the country. It contains several rich mines of silver. This metal does not appear to occur in the mountains which enclose the table-land of Tenochtitlan, but only in the mountainous district which constitutes the most north-eastern portion of the state, and where the Sierra Madre is connected with the mountains border-

ing the eastern margin of the table-lands. In this district are the mines of Real del Monte, Actopan, and Zimapan: there are also some mines of lead and iron. Another mining district lies south of the table-land of Toluca, the principal mines of which are in the neighbourhood of the small towns of Temascaltepec, Sultepec, Tasco, Huetamo, and Tetela del Rio, of which the three last-mentioned places are at no great distance from the Rio Bolsas. Carbonate of soda is collected in the districts surrounding the lakes of Tezcuco and S. Christoval. In the vale of Tenochtitlan are several antiquities. Near the town of Tezcuco are two large Mexican pyramids, or teocallis; and about twenty miles farther north, near the small town of Teotihuacan, is a group of nearly 200 of such pyramids, two of which, erected in honour of the sun and moon respectively, are of great dimensions. On the mountainous descent by which the road leads from Tenochtitlan to the Pacific, near the town of Cuernavacca, are some remarkable ruins, which seem to have been a fortress; they are called the fortress of Xochialco. For the description of the federal capital, see MEXICO. The capital of the state is Tezcuco, situated on the eastern border of the lake of that name, whose waters formerly approached the town, but are now about three miles from it. It is a small place, but has much increased since it has been made the capital of the state; it contains above 5000 inhabitants, and some manufactures of cotton. Chalco, with 3000 inhabitants, lies at the eastern extremity of the lake of Chalco. Toluca, with 12,000 inhabitants, ten miles north of the Nevado de Toluca, has a fine cathedral, and is well built. Zimapan, a considerable place, with 9000 inhabitants, is situated in the centre of the northern mining district. This state has two harbours on the Pacific, Acapulco [ACAPULCO], and Zacatula, at the mouth of the river Bolsas, but they are little frequented.

8. The state of Michoacan extends over the whole of the table-land of Michoacan and the low country lying between it and the Pacific; a portion of the hilly country south of both these districts also belongs to this state. The river Santiago traverses its north-eastern districts, and within its territories are the lake of Patzcuaro, the peak of Tancitaro, and the volcano of Xorullo. Its productions are various, but no article of export is supplied, except from the mines, which are situated along the eastern border of the state, in the mountain-range which runs between the table-lands of Toluca and Michoacan. The richest mines are near Tlalpujahua, Angangeo, and Zitaquaro. In the districts along the northern boundary-line carbonate of soda is collected, especially in the valley of Ystan, which is enclosed by hills, and situated on the descent from the table-land of Michoacan to that of Xalisco. In this valley are many hundred wells of hot water, of all forms and sizes, from a hole not larger than an inch, to ponds several yards in diameter: in some of them the temperature varies only from 110° to 130°, but in the greater number the water is in a state of constant ebullition. The capital of the state is Valladolid, at present called Morelia, in honour of general Morelos, a large town, with more than 25,000 inhabitants. It consists of one principal street, which is wide and straight, and several lanes. The chief square is spacious; and on its eastern side stands the cathedral, a fine building, which is loaded with ornaments, but they are tastefully arranged. The town is well supplied with water by an aqueduct, erected in later times, at the expense of the bishops, who reside here. Patzcuaro, containing 6000 inhabitants, is built near the lake of that name, at whose northern extremity is the town of Tzintzontzan, with 2500, formerly the capital of the kingdom of Michoacan. In the northern districts of the state are Zamora, with 6000 inhabitants, and Cuisco, a considerable place, on the banks of an extensive lake. Tlalpujahua, in the principal mining district, has 9000 inhabitants. This state has only one harbour, that of Manzanillo, which is little frequented.

9. The state of Xalisco comprehends the whole of the hilly region of Xalisco, and the lower country between it and the Pacific; its eastern districts extend over the hills which form the ascent to the table-land of Queretaro, and comprise also a small portion of that plain. Within its territories are the lake of Chapala, and the lower course of the Rio Santiago, from its efflux out of the lake to its mouth. The productions are as various as in all those states which are so diversified in climate; but it supplies for exportation only a small quantity of cotton and some cochineal. The mines are not important, with the exception of those of Bolaños. Carbonate of soda is collected in some places along the eastern border, and salt is made along the coast. At the south-eastern extremity of the state, in the district of Colima, is the volcano of Colima. The capital of the state is Guadalaxara, with 60,000 inhabitants. [GUADALAXARA.] The second place in importance is Lagos, near the eastern boundary, on the table-land of Queretaro, which contains 15,000 inhabitants, and is well built. Farther west is S. Juan de los Lagos, nearly as large a town, built in a deep barranca, and noted for its annual fair, which is held in the month of December. The town of Tepic is situated in a small plain, surrounded by volcanic hills, and considerably elevated above the Rio Santiago, which flows at some distance north of it. It is rather well built, contains 7000 inhabitants, and is forty miles from San Blas, which is its port. Between it and the town of Guadalaxara is a difficult mountain-pass, through the barranca of Michetiltic, and the populous town of Tequila. San Blas, the principal port of the state, is on the top of a rock a hundred and fifty feet high, which is precipitous on three sides, and very steep on the fourth: it rises out of a low swampy plain, which in the rainy season is completely under water. At this season the place is unhealthy; and the inhabitants, amounting to 3000, remove to Tepic. The harbour has good anchorage, but is not sheltered against south-western winds. The rocky islands called Tres Marias lie off this harbour. South of Cape Corrientes are the two small harbours of Navidad and Guatlan, which are little frequented. The low country surrounding the Volcano de Colima constitutes a separate district, which is under the general government. This district contains about 150,000 inhabitants, and much cotton is grown in it.

10. The state of Guanaxuato comprehends the western districts of the table-land of Queretaro, a part of the Sierra Madre, and a tract north of that range. A range which issues from the mountain-chain of the Sierra Madre traverses the plain in a southern direction, terminating south of the town of Guanaxuato. The widest and most fertile part of the Baxio lies within the territory of this state, which exports great quantities of wheat and Indian corn to other states. Rich mines surround the town of Guanaxuato. Besides the capital [GUANAXUATO], it contains several populous places. In the Baxio are—Zelaya, with 10,000 inhabitants, and a fine cathedral; Salamanca, with 15,000 inhabitants; Irapuato, with 16,000 inhabitants, and manufactures of cotton; and Villa de Leon, with between 25,000 and 30,000 souls. In the last-mentioned town are considerable manufactures of cutlery and saddlery. San Felipe, in a wide valley between two branches of the Sierra Madre, was formerly a considerable town, but is now in ruins. S. Miguel el Grande has 16,000 inhabitants, and manufactures of cotton and iron.

11. The state of Queretaro extends over the eastern portion of the table-land of Queretaro, and over a considerable part of the plain north of the Sierra Madre. It contains numerous and extensive fertile tracts, and a portion of the Baxio. It has some productive silver mines, which lie near its eastern boundary-line, along the river Moctezuma or Panuco, in the district of Cadereita; the most famous is El Doctor. North of it is the quicksilver-mine of San Onofre. There are also some lead-mines. The capital is Queretaro. [QUERETARO.] Cadereita, in the mining district, is a considerable place.

12. The state of S. Luis de Potosi comprehends by far the larger part of the southern portion of the great northern plain, and is traversed from west to east by the river Tamoin, an affluent of the Panuco. It is only rich in cattle. The mines are not numerous, but among them is the rich mine of Catorce. There are also some mines of copper. The capital, S. Luis de Potosi, is a large town, containing, with the adjoining villages, from 50,000 to 60,000 inhabitants. It has wide and well-planned streets, which are lighted by night. There are many large and substantial buildings, and numerous churches. The Palacio, or House of Congress for the state, a well-built edifice, occupies one side of the Plazza de las Armas; on the opposite side stands the cathedral: the two other sides are composed of shops and dwelling-houses. In the centre is a fountain. The town is well supplied with water by an aqueduct. The surrounding country is very productive in fruits, and the commerce is considerable.

13. The state of Zacatecas extends on both sides of the Sierra Madre, which traverses it towards its southern extremity in a north-western direction: the larger portion of

its territory lies on the great northern plain. The southern portion is productive in grain, and the northern arid plains contain abundance of cattle. Of the numerous mines, all of which are situated in the Sierra Madre, the most celebrated are those of Zacatecas and Sombrerete. The territory has nine lakes, from which carbonate of soda is collected in a crystallized state. Not far from the western boundary of this state, and south of the capital, an extensive tract is covered with immense ruins, called Los Edificios, which seem to mark one of the resting-places which the antient inhabitants of Mexico, the Azteks, erected on their emigration towards the south. This state contains several populous towns. Sombrerete, Freznillo, Ierez, Pinos, and Nochistlán have each a population varying from 14,000 to 18,000: they are all situated near the mines. The capital, Zacatecas, with the adjacent village of Veta Grande, contains 28,000 inhabitants, and is built in a ravine between high hills. The streets are narrow and crooked, but the churches are very large buildings of stone: the most remarkable is La Búfa, which stands on a high eminence, and looks like a fortification. Aguas Calientes, situated towards the southern extremity of the state, in a richly cultivated country, has 35,000 inhabitants, and manufactures of cloth. The streets are narrow, and the houses substantially built. Its cathedral has the appearance of a Moorish mosque.

14. The state of Durango includes the Sierra Madre from 24° to 27° N. lat., and comprehends also an extensive tract of level country skirting the range on the east, and belonging to the great northern plain. The terraces by which the mountains descend on the east are rich in agricultural products, the plain itself in cattle, and the Sierra Madre in metals. The richest mines are near Guarisamey, San Dimas, and Gavilanes, situated in narrow valleys in the Sierra Madre, at an elevation of more than 9000 feet above the sea. There are also mines of lead and abundance of iron ore. Between the town of Durango and that of Nombre de Dios is a plain, covered with basalt, about thirty miles in length and fifteen in width. This plain contains an extinct crater, more than 100 yards in circumference, and thirty yards deep. This sterile tract is called Breña. The capital is Durango, or La Ciudad de Victoria, with 22,000 inhabitants, a well-built place, with wide streets and several fine buildings. Nombre de Dios has 7000 inhabitants. Papasquiaro, in a valley of the Sierra Madre, near the rich mines, has a population of 6000. In the plain are S. Juan del Rio, with 10,000 inhabitants, and Villa de los Cinco Señores, on the Rio Nasas, along the banks of which cotton is grown.

15. The state of Occidente comprehends the provinces of Cinaloa and Sonora, or the whole tract extending between the Sierra Madre and the Gulf of California from 23° to 33° N. lat. It is rich in agricultural produce and fruits, though agriculture is in a backward state. It contains several mines of gold and silver; those of copper are still more important. At the most northern extremity, on the banks of the Rio Gila, and rather beyond the boundary of the state, are the Casas Grandes, ruins of numerous edifices which cover a large space. They are considered as one of the stations of the Azteks in their emigration to the south. South of the Rio Mayo the population consists only of whites, but north of it are seven native tribes, Opata, Ceres, Pimas, Yaqui, Mayos, Yumas, and Turumaras, which subsist by agriculture. Along the northern boundary, on the Rio Gila, the Appaches and Axua Indians lead a wandering life. The most remarkable places from south to north are—El Rosario, with 6000 inhabitants, in the neighbourhood of some mines. It carries on some commerce by means of the harbour of Mazatlan, which is about sixty miles distant. This harbour is spacious, but not safe, as it has many dangerous shoals and islands at its entrance. Cosalá, a well-built town, contains 5000 inhabitants: in its neighbourhood are several rich gold-mines. Culiacan, with 11,000 inhabitants, is built on rising ground on the south bank of the river Culiacan, just above its confluence with the Rio Mayo. It carries on a considerable trade. El Fuerte, the capital of the state, was till lately a small village, and has only risen to be a thriving town since it has been made the seat of the state government. It is built on the southern bank of the Rio del Fuerte, and contains 5000 inhabitants. Los Alámos, between the Rio del Fuerte and Mayo, has about 6000 inhabitants, and considerable silver-mines in its neighbourhood. It contains many well-built houses, and carries on a considerable commerce. Santa Cruz, near the mouth of the Rio Mayo, the principal town of the Mayo Indians, contains 10,000 inhabitants. Guaymas is the best port of Mexico on the Pacific, and capable of containing 200 vessels. It is secured from all winds by the elevated hills which surround the bay, and by Bird Island, which lies in the entrance. The town contains 3000 inhabitants, but suffers for want of water: the climate is hot, but healthy. Its trade with all the ports of the Mexican states along the shores of the Pacific is considerable. Pitic, on the Rio Pitic, has 8000 inhabitants, and is irregularly built; there are no streets, and the houses are scattered in every direction. It contains however some good houses, and carries on a considerable trade. Arispe, the most northern town of any importance, contains 3000 inhabitants, and is the principal seat of the military force which is situated in this part for the protection of the state against the Appaches. The hilly country which lies to the west of this town, called Pimeria Alta, had the reputation of containing rich gold-mines, which however, on examination, have been found to be of little value. There are however valuable copper-mines.

16. The state of Chihuáhua comprehends that portion of the northern plain which lies between the northern part of the Sierra Madre, and the middle course of the Rio del Norte, together with the mountain-region of the Bolson de Mapimi, and a tract of country south of it. The soil is in general very dry, and unfit for agricultural purposes: cultivation is limited to the river bottoms and a narrow strip of country along the declivity of the Sierra Madre; but this state has many herds of cattle, horses, and sheep. The mines are rather numerous. The most important are in the Sierra Madre, at El Parral, Botapilas, and Jesus Maria: those of S. Eulalia are in a hill which stands isolated on the plain, about twelve miles from Chihuáhua. Near the base of the Sierra Madre, and not far from the boundary-line between this state and Sonora, are ruins of great extent, called Casas Grandes, like those on the Rio Gila: these also are considered as one of the stations of the Azteks in their emigrations. The population of the plain consists entirely of descendants of Europeans; but in the Bolson de Mapimi are the Comanches, and, along the northern frontier of the state, the Appaches and Chichimequos. The capital, Chihuáhua, is a well-built town, with regular streets and many large houses. Its cathedral is an extensive building; and the town is well watered by means of an aqueduct, which is supplied by a river about eight miles above the town. Its population once amounted to 70,000, but at present it does not exceed 12,000. S. Bartolomeo, situated towards the boundary of Durango, contains a population of 28,000. It is badly built, and the streets are narrow, but it carries on a considerable commerce with the agricultural produce of the fertile district in which it is situated, consisting of wool, maize, cotton, and wild honey. Not far from it to the west is El Parral, which contained 50,000 inhabitants when the mines were productive, but now only 7000. Parras, near the lake of that name, is a small town in a district noted for its vineyards.

17. The state of Coahuila or Cohahuila extends over the north-eastern portion of the northern plain, over that which lies between the Bolson de Mapimi on the west, and the lower course of the Rio del Norte on the east, and which stretches southwards to the boundary of Zacatecas (25° N. lat.). To this extensive country is added the still more extensive tract to the north and east of the Rio del Norte, or the province of Texas. The most sterile portion of the northern plain is included in this state, and lies along the boundary of Zacatecas. Farther north, between 27° and 29° N. lat., are several watercourses with fertile bottoms, and considerable tracts of cultivable ground. But cattle, and particularly mules and horses, constitute the commercial wealth of this country, and are exported in considerable numbers to the United States of North America. Texas is very fertile, but little cultivated. The north-western parts of the state are much exposed to the predatory incursions of the Appaches and Comanches, who inhabit the Bolson de Mapimi and the hills of San Saba. The capital of the state is Saltillo, situated near its eastern boundary and the edge of the table-land. It contains about 12,000 inhabitants, and is remarkable as the only place at which the steep declivity with which the table-lands of Mexico terminate towards the east can be passed by heavily laden carriages; farther south at least no such place is known to exist. It has several good streets, communicating at right angles with the Plaza, in the centre of which is a large reservoir, which supplies the

town with water. It carries on considerable commerce. In this town a fair is held, which is much frequented by merchants from the adjacent states. Montelovez, farther north, has 3500 inhabitants. Santa Rosa, to the north-west of Montelovez, has 4000 inhabitants, and some mines in its neighbourhood. El Presidio del Rio Grande is situated where the Rio del Norte begins to be navigable for larger boats, and has 2500 inhabitants. Monclova, farther down, is a thriving place, with some trade.

Texas is almost entirely in its natural state. The Spaniards have only formed a few settlements in the districts adjacent to the Rio del Norte and the Rio Guadalupe, and their principal town is S. Antonio de Bexar, a small place. In the country farther east numerous emigrants from the United States of America and Europe have settled, but none of their settlements have attained any degree of importance, except S. Felipe de Austin, a small town.

This country has a good harbour in Galveston Bay, which is an extensive sheet of water, separated from the Gulf of Mexico by Galveston Island. The entrance to it, between the mainland and the eastern extremity of the island, has always twelve feet of water on the bar. The bay has generally about nine or ten feet of water, but towards its northern extremity, into which the navigable rivers Trinidad and S. Jacinto empty themselves, the bay is crossed by a bar, called Red Fish Bar, which at high tides has only five feet, and in northerly winds not more than three feet of water. The anchorage between Galveston Island and another smaller one, called Pelican Island, is good, in five fathoms of water, with a muddy bottom. The inhabitants of Texas who are not descendants of Spaniards have been for some years in a state of rebellion against the government of the United Mexican States.

18. The state of Nuevo Leon lies almost entirely to the east of the table-land, in the lower region which extends from it to the Gulf of Mexico, but it does not reach the shores of the sea, being separated from it by the intervening state of Tamaulipas. Though this country is not much elevated above the sea, and its climate resembles that of the Tierras Calientes, its surface is far from being so level as the country farther south. That part which lies south of the Rio del Tigre is indeed rather level, or undulating, but north of the river are mountains of great elevation, probably more than 10,000 feet above the sea, and in which some rich mines are found near Pesqueria and Salinas. The lower parts of the country are very fertile, but only cultivated in isolated places. Though the climate is hot, it is healthy. Monterey, the capital of the state, contains 15,000 inhabitants, and its commerce is considerable on account of the neighbouring rich mines. Linares has 4000 inhabitants, and the neighbourhood abounds in cattle.

19. The state of Tamaulipas extends along the Gulf of Mexico from the mouth of the river Panuco to that of the Rio del Norte, and still north of the latter to the Rio Nueces, but it does not reach farther inland than from 50 to 70 miles, except at its northern extremity, where it may be about 150 miles across. It is a low country, in which only a few hills occur, and it is unhealthy. Though very fertile, except along the sandy sea-shore, it is badly cultivated and thinly inhabited. Its coast-line, which is about 400 miles, is inaccessible on account of the long narrow islands which skirt it, but the navigation is not dangerous, as the soundings are very regular along the whole line. There are harbours only where the rivers join the sea, but their entrance is always crossed by bars, with only a few feet water on them. This circumstance is attributed to the current which, during the northern gales, sets with some force to the south. The commercial wealth of this state consists in its forests, in which fustic and logwood are cut to a great extent. The capital of the state is Pueblo Nuevo de Tamaulipas, situated at the southern extremity of the state, on the northern bank of the river Panuco, about six miles from its mouth. The harbour is good and safe, and the bar at its entrance has generally twelve feet of water, but the navigable channel is scarcely a cable's length across. The town, which was founded in 1825 or 1826, is rapidly increasing. Its commerce is considerable, as most of the European goods which are consumed on the northern plain are landed here. Sotto la Marina is a small harbour, not much frequented, near the mouth of a little river, the Rio de Santandero, on the banks of which is the small town of Santandero, formerly the capital. Matamoros, on the Rio de Norte, about 40 miles from its mouth, has about 3000 inhabitants; vessels not drawing more than eight or nine feet water may ascend the river to this place.

20. The territory of New Mexico comprehends the whole vale of the Rio del Norte, extending from its source along its upper course to 35° N. lat., and also the desert del Muerto and a fertile tract of country south of it, extending from 32° 30′ to 31° N. lat. From the northern district great numbers of sheep are sent to the southern states, and wool is exported. The southern district contains some tracts which are adapted to raising agricultural products and fruits. The mountainous country between these two districts contains copper-mines. The mountains to the east and west of it are inhabited by several tribes of Indians, as Utahs, Nanahaws, and Keres. Many of them are settled among the whites in the villages in the level country. Santa Fé, the capital, is built on a small stream which joins the Rio del Norte from the east, and at no great distance from the last-mentioned river. It contains about 4000 inhabitants, and has some commerce with the United States of America and the state of Chihuahua. North of it is the town of Taos, which, according to Humboldt's statement, has a population of about 9000 souls. Paso del Norte, in the district south of the desert del Muerto, has a population of more than 5000 souls, and is situated on the northern border of the northern plain. The surrounding country produces abundance of maize, wheat, and excellent fruits. Its wine and grapes are celebrated over the whole of the Mexican confederation. It owes its fertility to irrigation by means of canals which convey the abundant water of the Rio del Norte over a district of considerable extent.

21. Lower California, and—22, Upper California. [CALIFORNIA.]

Manufactures.—Before the Revolution (1810) there were many flourishing manufactures, the annual produce of which amounted to from eight to ten millions of Spanish dollars, or about two millions of English money. The most considerable were those of cotton and wool in the towns of Puebla, Cholula, Tlascala, Queretaro, Lagos, Guadalaxara, and Tezcuco. The manufactures of soap, leather, and saddlery were also considerable. The manufacturers owed their prosperity to the high price at which, under a system of monopoly, European goods were sold in that country. After the harbours were thrown open to a free trade (in 1820) they began to decline. The manufactures of cotton are now almost completely destroyed. Those of wool are in a lingering state, but those of soap, leather, and saddlery seem to be on the increase.

Commerce.—The commercial intercourse between the coast and the table-lands is difficult on account of the steep ascent to the table-lands from the coast. On the east there are only two carriage-roads, as has been already observed, which lead to the table-land; and this is also the case on the western coast, where the communication between Acapulco and Mexico, and between San Blas and Guadalaxara, is carried on by roads which are only passable to mules and horses. No such obstacle exists between the harbours of Mazatlan and Guaymas on the western coast, and the country farther back, but no road leads from them over the Sierra Madre, by which the goods landed at those places could be carried to Durango or the towns of the northern plain. Even in those parts where there is no obstacle to the use of carriages, the goods are commonly carried by mules, on account of the great number of these animals, and the low price at which they are bought.

The maritime commerce is considerable. In the beginning of the present century the exports, according to Humboldt, amounted to twenty-two millions of Spanish dollars, and the imports to fifteen millions of dollars. Between 1820 and 1830 however the exports considerably diminished, on account of the comparatively small produce of the mines, the precious metals constituting the principal article of exportation; and as they have not yet been restored to that flourishing condition in which they were before 1810, the amount of the exports probably still falls considerably short of the amount stated by Humboldt, for the other articles have not increased much. According to Humboldt's estimate the exports in 1803 consisted of the following articles, and their value in dollars:—

Gold and silver .	17,000,000 dollars.
Cochineal . .	2,400,000
Sugar . .	1,300,000
Flour . .	300,000
Indigo . .	280,000

Salt meat	100,000 dollars.
Hides	80,000
Sarsaparilla	80,000
Vanilla	60,000
Jalap	60,000
Soap	50,000
Campeachy wood	40,000
Tabascan pepper	30,000
Spanish dollars	21,780,000

Ward, following the statement of official documents, found that in this estimate Humboldt had overrated the exports by 2,618,648 dollars; as no flour had been exported, and the exports of cochineal amounted only to 1,100,327 dollars, and those of sugar to 281,025 dollars. Though the facts which have come to our knowledge are isolated, and in many instances not well authenticated, we shall attempt to make a rough estimate of the exports for the years following 1830, preserving Humboldt's statement where we have no more recent data:—

Gold and silver	14,000,000 dollars.
Cochineal	1,100,000
Sugar	300,000
Indigo	200,000
Salt meat	100,000
Hides	80,000
Sarsaparilla	80,000
Vanilla	100,000
Jalap	80,000
Soap	50,000
Campeachy wood	100,000
Fustic	80,000
Tabascan pepper	40,000
Coffee	20,000
	15,230,000

This may be considered as an approximation to the amount of the exports from the harbours of the Gulf of Mexico, namely, from Sizal, Campeachy, Villa Hermosa, Alvarado, Vera Cruz, Tampico, Tamaulipas, Sotto Marina, and Matamoros. No estimate can be formed of the exports from the harbours of the Pacific, from Acapulco, San Blas, Mazatlan, and Guaymas, and from those of Upper California. We only know that a considerable quantity of sugar is sent to Guayaquil and Lima; that at the port of Guaymas much copper, which contains gold, is shipped for China, where, as it appears, an easy method is known of separating the metals; and that large quantities of tallow and salted hides, with some flour, are exported from S. Diego in Upper California. No kind of commercial intercourse seems to exist between Central America and the Mexican states, but a considerable number of mules and horses, and some wool, are exported to the United States of North America, chiefly from Cohahuila and New Mexico.

For want of a general and more recent estimate of the imports, we shall transcribe that of Humboldt, founded on facts which refer to the beginning of the present century. It may still be useful as showing the principal articles consumed in Mexico, and their proportion. Though the consumption of all these articles, with the exception perhaps of cocoa and wax, must have greatly increased, and especially that of cotton goods, yet it seems probable that their value in money is not greater than was paid for them at the time of Humboldt, as most of the articles were then sold for double and some even for four times the present prices. Cocoa does not appear at present to form a large article of import, great quantities of it being grown in the state of Tabasco.

Humboldt's estimate of the imports at the beginning of the present century is:—

Articles.	Value in dollars.
Ropas (linens, cottons, cloth, and silk)	9,200,000
Paper	1,000,000
Brandy	1,000,000
Cocoa	1,000,000
Quicksilver (for the mines)	650,000
Iron	600,000
Steel	200,000
Wine	700,000
Wax	300,000
	14,650,000

The commerce is mostly carried on in foreign vessels, as these states have a comparatively small number of merchant ships. The vessels of the United States of America almost exclusively visit the smaller ports, as Villa Hermosa, Alvarado, Sotto Marina, and Matamoros. In addition to the vicinity of the United States, their products differ from those of the Mexican states. All the products exported from Mexico find a ready market in the United States, and are easily paid for by the manufactured goods of those states and of Europe. The American vessels, being in general of a smaller size, can safely pass the bars of the rivers, which cannot be done by the larger British vessels, which are therefore chiefly confined to the harbours of Vera Cruz, Tampico, and Tamaulipas. Next in number to the American are the British vessels, and then those of France, from Bordeaux and Hâvre, and lastly those of the free German towns of Hamburg and Bremen. Swedish and Danish vessels rarely appear in these ports.

History and Constitution.—Though Columbus in his last voyage approached the peninsula of Yucatan, he did not come in sight of it. Thirteen years later (1517) the peninsula was discovered by Francisco Hernandez Cordova, who sailed along the coast from Cape Catoche to Campeachy Bay. The following year, Juan de Grijalva continued the discoveries along the same coast northward to the mouth of the Rio Panuco; he visited the islands of Sacrificios and S. Juan de Ulua, opposite the present town of Vera Cruz, and gave them the names which they still preserve. His account of the wealth of the country excited the desire of conquest. In 1519 Hernan Cortes landed at the place where Vera Cruz now stands, but the town which he founded and called Villarica was some miles farther to the north, near a small harbour named Chihauitzla. With his little army he soon ascended the table-land, numerous inhabitants of which he found united under a powerful sovereign, the king of the Azteks, Montezuma, or more correctly Moctezuma. Within the limits of this empire there were some small republics, of which that of Tlascala united with Cortes. Cholula was also a republic, and the name of a third is preserved, that of Huajocingo; all three were situated within the territories of the present state of Puebla. The empire of the Azteks did not extend over all the table-lands; the table-land of Michoacan constituted a separate and independent kingdom. After two years of continuous and laborious warfare, Cortes succeeded in overturning the empire of the Azteks, and the smaller states were subjected to the Spaniards almost without a struggle. The position which the Spaniards held with respect to the natives of the country very much resembled that of the nations of German origin who overturned the Roman empire and settled in the countries of Western Europe. Like them, the Spaniards were obliged to establish a kind of feudal system, to protect themselves against the much more numerous native population. In Europe the victors and vanquished in the course of time united so as to form one nation, but such a change has not taken place in Mexico, and probably never will take place. The Spaniards and natives belong to two different races of men, differing in colour and in many other respects. The Spanish conquerors also had attained a higher degree of civilization, whilst in Europe the conquerors learned from the conquered the most useful arts of civilised life. Even now, more than three centuries since the conquest, the Spaniards and natives constitute two perfectly distinct classes.

As the number of the conquistadores, or companions of Cortes, was very small, in comparison with the native population, they were anxious to bring over more of their countrymen. A considerable number of Spaniards accordingly annually emigrated to Mexico, and there acquired great wealth, as officers of government, merchants, and adventurers in mining. As many of these Spaniards were possessed of extensive property in land within Mexico, their descendants the Creoles settled of course in that country, and their numbers were continually increasing. The Spanish government however seems not to have formed a correct idea of their condition among the natives, and to have thought that the government of that country could only be entrusted to persons who considered Spain as their native country; it therefore excluded all the Creoles, or descendants of Spaniards born in Mexico, from all offices of government, and even from commissions in the army. Such exclusion excited in them a considerable degree of ill-will against Spain and the Spaniards, which would probably have manifested

itself in resistance and rebellion, if they had not feared that the native population would take advantage of such a circumstance to effect their own destruction. They had still to fear another enemy, which had grown up imperceptibly among them. Few of the Spaniards had brought wives with them. From their intercourse with the native women sprung up a race called metis, or mestizos, which increased still faster than that of the Creoles, who however, being in possession of great wealth, were well aware that as long as a regular government subsisted they had nothing to fear either from the natives or the mestizos. This will account for the fact, otherwise difficult of explanation, that no signs of active dissatisfaction manifested themselves in Mexico during the first thirty years after the United States of North America had obtained their independence, though the Mexicans were well acquainted with the advantages which their neighbours had obtained. It is even possible that the political condition of Mexico would not have undergone any change for a long time, but for the events in Europe and in Spain in 1808. By the intrigues of Bonaparte the royal family were compelled to abdicate the throne of Spain, and he conferred the whole Spanish monarchy on his brother Joseph, then king of Naples. The Spaniards in Mexico and the Creoles were unanimous in declaring their resistance to the government established by the French. The viceroy could no longer receive orders from Spain, and it was necessary to organise a government which should act independently under a certain sanction, and with authority. But as to this point they disagreed. The Creoles wished to establish a national representation; the Spaniards opposed the measure, and prevented the establishment of a system of national representation for Mexico. The Creoles submitted: but the public mind had been agitated by the discussions which had taken place, and soon afterwards, in 1810, the natives and the mestizos rose against the government. They were headed by Don Miguel Hidalgo y Castilla, the cura or parish priest of Dolores, a small town in the state of Guanaxuato. The Creoles sided with the Spanish government. Hidalgo, who had soon an immense force with him, took Guanaxuato by storm, and occupied Valladolid, whence he advanced over the table-land of Toluca to that of Tenochtitlan. The Spanish governor sent a small corps against him, which was defeated by Hidalgo on the 30th of October at Las Cruces, a pass in the chain which separates the table-lands of Tenochtitlan and Toluca. But notwithstanding this victory, Hidalgo retreated, and eight days afterwards was in his turn defeated by Calleja at Aculco. Hidalgo retired to Valladolid and Guadalaxara; and in the neighbourhood of the last-mentioned town he was again defeated, and soon afterwards taken prisoner and shot. In the meantime the whole country had risen in insurrection, and many leaders began to act separately. The most remarkable among them was Don Jose Maria Morelos, cura of Nucupetaro, who with great activity, talents, and success maintained the southern provinces in rebellion against the governor, and formed a *junta*, or central government, which in September, 1811, assembled in the town of Zatacuaro, in the state of Michoacan. But that town was soon afterwards taken by Calleja, and the junta were dispersed. Calleja however was soon obliged to march against Morelos, who had penetrated into the table-land of Tenochtitlan from the south. He was attacked by Calleja in the town of Cuantla y Amilpas, and after defending himself for nearly three months with great skill and gallantry, he abandoned that place and took Oaxaca. The junta was now increased by new members, and under the title of the National Assembly it declared the independence of Mexico, on the 13th of November, 1813. But after that event Morelos had less success in his daring enterprises; and in November, 1815, he was taken prisoner, conducted to Mexico, and shot. Many of his companions in arms maintained the conflict for some time, but they did not act in concert with one another, especially after one of them, Terán, had dissolved the congress, which had been transferred from Oaxaca to Tehuacán in the state of Puebla. The viceroy Venegas, supported by the gallantry and skill of Calleja, destroyed successively the armies of these chiefs, so that when Don Xavier Mina, the famous Spanish guerilla chief, landed in Mexico in 1817, the fortune of the insurgents was at so low an ebb, that he was unable to restore their cause, and he perished in the attempt. The country gradually became more tranquil, and in 1820 it was restored nearly to the same degree of order which it had enjoyed before 1808, to which fortunate result the mildness of the new viceroy Apodáca materially contributed.

The events which occurred in Spain in the beginning of 1820 suddenly changed the aspect of affairs, and deprived Spain of the most valuable of her possessions in America, which it had regained at the cost of much blood and money. The Spaniards and the Creoles, who had formerly made common cause, were now divided into two parties, royalists and constitutionalists. Apodaca, who inclined to the former party, wished to overthrow the constitution in Mexico, and chose for his instrument Don Augustin de Iturbide, a young man, born in the province of Valladolid, of respectable but not wealthy parents. He had distinguished himself in the battle of Las Cruces, and always shown great attachment to the Spanish party. Iturbide had about 800 men under his command, when, on the 24th February, 1821, at the little town of Iguála, on the road from Mexico to Acapulco, he issued a proclamation, which since that time has been called the Plan of Iguála. Its object was to conciliate all parties. It was to establish the independence of Mexico, and still to preserve its union with Spain. To effect this, the crown of Mexico was to be offered to the king of Spain, and in case of his refusal, to one of his brothers, Don Carlos or Don Francisco de Paulo, provided they would consent to reside in the country. Though Iturbide had certainly exceeded the powers which he had received from Apodaca, the viceroy, seeing that this proposal met the wishes of most persons, took no step to crush Iturbide; and the Spaniards of the capital, alarmed at this delay, deposed him, and placed Don Francisco Novella at the head of affairs. But the disorders which always attend such violent changes gave Iturbide time to unite his troops with those of Guerrero, the only insurgent chief still existing in the country, and to bring over to his party all the western and northern provinces. Before the month of July, the whole country recognised his authority, with the exception of the capital, in which Novella had shut himself up with all the European troops. At this moment he received intelligence of the arrival at Vera Cruz of the new constitutional viceroy Don Juan O'Donoju. Iturbide hastened to the coast, obtained an interview with O'Donoju, and persuaded him to accept the Plan of Iguála as an armistice and final settlement, if it should be approved in Spain. This is called the treaty of Cordova, from the place where it was made. Iturbide thus got possession of the capital, where a junta and a regency were established, but in such a form that all power remained in the hands of Iturbide. By a decree of the Cortes, dated the 13th February, 1822, the treaty of Cordova was declared to be illegal, null, and void; and Iturbide, who had the power in his hands, and a great number of adherents, found no difficulty in ascending the throne. The army declared him emperor of Mexico on the 18th of May, 1822, and he took the title of Augustin I. He was acknowledged by the Mexican congress, which had been opened on the 24th of February; but a struggle for power soon arose between Iturbide and the congress, which the emperor terminated by dissolving the assembly in the same manner as Cromwell dissolved the Long Parliament, on the 30th October, 1822. On the same day he formed a new legislative assembly, composed of persons favourable to his wishes and intentions. But he had not skill enough to reconcile his companions in arms to these changes. Several generals declared against his proceedings, and prepared for resistance. Iturbide, terrified at the storm which was ready to burst on all sides, called together the old congress, abdicated in March, 1823, and went to Europe, whence however he returned to Mexico in 1824. He had been outlawed by the congress, and upon landing on the coast, he was shot at Padilla, in Tamaulipas. Thus Mexico obtained its indedence and a constitution, without a civil war. But as this object had only been obtained by the energetic cooperation of the army, it was to be feared that the peace of the country would be interrupted by the discontents of the generals. This has in fact occurred several times; but happily such insurrections have been easily suppressed, with the exception of that got up by Santanna, who had distinguished himself in the struggle against Iturbide. Under pretext of the country being discontented with the administration, he collected an army in 1832, brought some other generals over to his side, and, after several conflicts, he succeeded in placing himself at the head of government. Being aware that he was less distinguished as a statesman than as a general, he undertook in person an expedition

against Texas, the population of which, consisting almost entirely of emigrants from the United States of America, had risen into open rebellion against the government. After some success, he was taken prisoner. This circumstance was favourable to the government, and since that time the peace of the country has not been materially disturbed.

The constitution of the republic was formed immediately after the fall of Iturbide, and the Fundamental Act was published on the 4th of October, 1824. The constitution is modelled on that of the United States of America, and most of the articles are transcripts of the corresponding articles in the constitution of that confederation. The legislative power is vested in a congress, which consists of two chambers, the house of representatives and the senate. The house of representatives is composed of members elected for a term of two years by the citizens of the states. Each state elects a representative for every eighty thousand inhabitants, and one more if there is a fraction exceeding forty thousand. Native Mexicans alone can be chosen, or such as have resided in the republic for more than eight years, who must also possess landed property to the amount of 8000 dollars, or some trade or profession which produces 1000 dollars annually. The senate is composed of two senators for each state, elected by a plurality of votes in the state legislatures. He who has the greatest number of votes retains his seat for four years; the other only for two years. The members of the senate must possess all the qualifications requisite for a deputy, and must also be thirty years of age; a deputy may be only twenty-five years of age. The congress meets every year on the 1st of January, and closes its ordinary sessions on the 15th of April; but an extraordinary congress may be called by the executive. The executive power is vested in a president and vice-president, both elected by the state legislatures for a term of four years. Native Mexicans only, who are thirty-five years of age and resident in the country, can be elected to these high offices. Though the great outlines of this constitution resemble, in all important points, those of the United States of America, the Mexican congress is vested with much greater power. It has not only a larger revenue, and the right of deciding on all matters respecting religion, but it has likewise the power of determining many points which in the United States of America belong to the several states. This difference arises from the different way in which the general congress was formed. In the United States of North America the state governments were fully organised before the formation of a general government, and in the Act of Confederation the states preserved all their original power which it was not thought expedient to confer on the general government. In Mexico however the general government had to establish the state governments, and could appropriate to itself as much power as it thought fit.

(Humboldt, *Essai Politique sur la Nouvelle Espagne;* Poinset, *Notes on Mexico;* Lyon's *Journal of a Residence and Tour in the Republic of Mexico;* Ward's *Mexico in* 1827; Hardy's *Travels in the Interior of Mexico in* 1826-1828; Pike's *Exploratory Travels through the Western Territory, &c.; A Sketch of the Customs and Society in Mexico;* Coulter's 'Notes on Upper California,' in the *London Geogr. Journal,* vol. v.; Galindo's 'Description of the River Usumasinta,' in the *London Geogr. Journal,* vol. iii.; Iuarro's *History of the Kingdom of Guatemala; Holley's Observations on Texas; Constitucion Federal de los Estados Unidos Mexicanos,* Mexico, Oct. 14, 1824.

MEXICAN ARCHITECTURE. Although some light has of late years been thrown upon this subject, it is still involved in much obscurity; nor can we do more than advert to one or two points that deserve attention. The first of these is, that the older and more important monuments of Mexico are not, strictly speaking, Mexican, but the productions either of the Toltecans or of some still more antient nation. Secondly, these remains are by some supposed to exhibit affinity, both in their general character and mode of construction, and the style of sculpture and the costume represented in them, to those of the Egyptians. Thirdly, hieroglyphic inscriptions on the walls of their edifices were employed by both people.

With regard to the aboriginal architecture of this part of America, it resembles that of Egypt, not only in the vast scale and massiveness of its monuments, but in the application of the pyramid, or of forms composed of it. Pyramids not inferior to those of Egypt, and some of even still larger dimensions in their plan or base, exist in the Mexican territories; and examples of the second class occur in pyramid towers, consisting of a series of truncated pyramids placed one above another, each successive one being smaller than the one on which it immediately rests, so that it stands upon a platform or terrace. Of this kind was the pyramid tower or temple at Xochicalco, which, according to Nebel's restoration of it, consisted of five stories, and consequently had four terraces: its sides were ornamented with rude bas-reliefs, the figures of which were about four feet high and had a projection of three inches. The pyramid tower of Cholula resembles in no small degree the temple of Belus as described by Herodotus, inasmuch as it consists of eight stories, each forming a platform on which stands the one above it. The angle of inclination of these truncated pyramids is seldom less than 70 degrees, which differs little from that of the sides of the Egyptian temples.

Some of these edifices appear to have been not temples only, but to have contained sepulchral chambers and apartments for the priests; they had also descending galleries leading down into caverned recesses or halls, that were doubtless used either for religious mysteries or as places of concealment for treasure.

One of the most stupendous monuments of the style of architecture was the great temple at Palenque (built, according to the bold assumption of Lord Kingsborough, after the model of that of Solomon), which comprised within its extensive precincts various sanctuaries and sepulchres, courts and cloisters, subterraneous galleries, and cells for the habitation of the priests. The whole rests on a platform, composed of three graduated terraces, and forms a spacious quadrangle enclosed by porticoes. On each side of the exterior is an ascent or flight of stairs, and on the east a second flight leading down, after the first is ascended, into the cloistered court. Beneath the cloisters are what are conjectured to have been initiatory galleries; and in the centre of the quadrangle is what appears to be the ruins of an altar or 'high place.' The city of Palenque itself exhibits a variety of buildings, temples, palaces, baths, and private houses, all manifesting excellence of workmanship combined with considerable skill in design.

The remains of a palace at Mitla show that it must have been an edifice of great extent and grandeur; and the walls appear to have been sculptured or tooled externally, in imitation of mat or basket work, a species of decoration characteristic of Toltecan taste, and often found in sepulchral chambers. This same building has also a portico with plain cylindrical columns differing from any found elsewhere.

In order to give an idea of the extraordinary vastness of some of these Mexican or Toltecan constructions, we may adduce the instance furnished by the great teocalli, or pyramid, of Cholula, the side of whose base is 1440 feet, whereas that of the great pyramid of Jizeh is only 763 feet. The height however is, according to Humboldt, not more than 177 feet, and as the receding terraces are very wide, and the area of the upper platform or terrace small in comparison with the area of the base, the outline of the whole would not be that of a continuous pyramid, but merely such as might be inscribed within such figure.

At Teotihuacan, about eight leagues to the north-east of the city of Mexico, are an immense number of pyramids, several hundred small ones ranged in files or lines, and two larger ones consecrated to the sun and moon. Each of the latter is divided into four platforms, the slopes between which consisted of steps, and on the summit was a colossal stone statue covered with plates of gold, which were stripped off by Cortes's soldiers, and the statues themselves destroyed.

Besides monuments which are chiefly works of magnificence, others exist which attest the high degree civilization attained by the Toltecans, such as Cyclopean roads and bridges. The former of these were constructed of huge blocks of stone, and frequently carried on a continued level, so as to be viaducts across valleys. There are also throughout Central America numerous excavations or rock-hewn halls and caverns, called by the natives 'granaries of the giants.' They resemble the Cyclopean fabric near Argos known by the name of the Treasury of Atreus, are generally dome-shaped, and the central apartment is lighted through an aperture in its vault. Other points of resemblance to Cyclopean masonry may be found in the doorways

to these subterraneous galleries and apartments, which are similar to the gate of Mycenæ; and also in the peculiar triangular arch formed by courses of stones projecting over each other. Arches of this mode of construction are found in the cloisters of the building at Palenque. The remains of sculpture found in Mexico are numerous, and of great variety both of form and material. Captain Vetch has described (*London Geog. Journal*, vol. vii., p. 1) a collection of stone figures in his possession, which were recently procured from the banks of the river Panuco.

MEXICO, or, as it is now commonly written, Mejico, the capital of the United Mexican States, is situated in 19° 25′ N. lat. and 99° 10′ W. long., 7468 feet above the level of the sea. It stands nearly in the centre of an extensive plain, which, from being surrounded by high hills or mountains, is commonly called the Vale of Tenochtitlan, which was the name given to the town before the year 1530. This vale has an oblong form, extending from south to north fifty-two miles, and from east to west thirty-four miles. Its circuit, measured along the crest of the ranges which enclose it, is nearly 205 miles; and its area is 1710 square miles, or nearly equal in extent to the county of Lancaster; but about one-tenth of its surface, or 164 square miles, is occupied by four lakes. The largest of these lakes, that of Tezcuco, which covers a surface of 77 square miles, occupies the centre of the vale, and is only about three feet and a half lower than the great square of the town, which stands on its western shores, on swampy ground. Towards the southern extremity of the vale is the lake of Chalco, which contains a small island and the pleasant village of Xico, and is separated by a dike from the lake of Xochimilco. The surface of these two lakes is nearly four feet above the great square in the town, and they occupy nearly fifty square miles. Their water is fresh, while that of the other lakes is brackish or salt. North of the lake of Tezcuco is the lake of St. Christoval, which covers about twenty-seven square miles, and is nearly twelve feet higher than that of Tezcuco. It is divided into two parts by a dike, and its northern portion is called the lake of Xaltocan. The north-western corner of the vale is occupied by the lake of Zumpango, which is likewise divided into two portions by a dike: the eastern is called the lake of Coyotepec, and the western that of Zitlaltepec. This lake is nearly thirty feet above the lake of Tezcuco, but occupies only ten square miles. During the rainy season the water, descending abundantly from the ranges which enclose the vale, is poured into these lakes, which have no outlet: the greatest quantity enters the lake of Zumpango, which is the most elevated. It frequently happened that in very wet seasons the water which accumulated in these lakes inundated the lower portion of the vale, and rose several feet in the streets of Mexico. To prevent such an occurrence the Spanish government caused a canal to be made through the mountains of Nochistongo, which lie north-west of the lake of Zumpango, by which the superabundant water from the lake is carried off. This stupendous work, known by the name of the Desague of Huehuetoca, is above twelve miles long, and for more than 1000 yards is cut through rocks from 60 to 75 feet high. It is justly considered one of the most astonishing hydraulic works in the world.

The mountains which enclose the vale are lowest on the north side, where they rise only a few hundred feet above the level grounds of the vale, but they are higher on the other sides, especially on the south and south-east. Near the south-eastern angle is Mount Istaccihuatl, which is 15,704 feet above the sea-level, and is always covered with snow. It is connected by a ridge with Mount Popocatepetl, which lies farther south, and attains the height of 17,884 feet. The surface of the vale itself is not a level plain, but is intersected by very irregularly shaped rocks, which are sometimes isolated and sometimes in groups singularly arranged. The most elevated are the Cuesta de Barientos, north of the town, which rises 288 feet above its base; and the Cerro de Chiconautla, which lies to the north-east, and rises 1055 feet above the lowest part of the vale. The districts between the western range and the lakes are richly studded with villages and towns, and contain extensive tracts of cultivated ground, where wheat and the other grains and vegetables of Europe are raised in abundance; but large tracts of country east of the lakes are sterile, the surface being covered with a saline efflorescence, and the cultivated spots and villages are distant from one another.

Mexico is one of the finest cities in the world. In the dry season it is at some distance from the lake of Tezcuco, whose waters in the rainy season are sometimes driven by easterly winds to the eastern border of the town, which is protected against inundations by dikes. The streets are very wide, and at right angles to each other, so that by looking down any two at the point where they intersect each other, the spectator commands a view of nearly the whole town. They are all well paved, and have side-walks of flat stones. The private houses, though spacious, are rather low, seldom exceeding one story; but being constructed either of amygdaloid or porphyry, they have an air of solidity and even of magnificence. The moderate height of the public as well as private buildings is owing partly to the difficulty of laying a good foundation, as water is uniformly found at a very few feet from the surface, and partly to the frequency of earthquakes. In consequence of the water all the larger buildings are raised upon piles. The roofs of the houses are flat, and as they sometimes communicate with one another for a considerable distance, when seen from an elevation they look like immense terraces. The houses are all squares, enclosing open courts, which are surrounded by corridors. The entrance leads through a large gate into the court, and the stairs are opposite to the gate. The best apartments, which are generally painted, are towards the street, and all the windows are ornamented with balconies.

The squares are spacious and generally surrounded by buildings of hewn stone in a good style of architecture. The principal square is the Plaza Mayor, which, on two sides, is surrounded by the cathedral and the palace, and on the two other sides by shops and dwelling-houses, with the exception of the Casa del Estado, or the palace of Cortes. In the centre of the square was formerly a magnificent equestrian statue of Charles IV. of Spain, which has been removed since the Revolution. This square is the market for vegetables and fruits, those of the south of Europe being cultivated in the vale of Tenochtitlan itself, whilst the fruits of the tropics are brought from the plain of Cuantla Amilpas and from Istla. [MEXICAN STATES.] Manufactured goods are sold in the Portalos, or covered colonnades, of which there are several on a large scale, and all well supplied with goods from Europe and China. Several principal shops open into the Portales, and innumerable petty venders display their wares, crowded on tables, in boxes and in baskets. The Parian, or bazaar, is a square building, divided into uniform compartments by two principal cross streets, and others subdividing it. The palace, in which the viceroy formerly was lodged, and which at present serves as the residence of the President of the United Mexican States, and also contains the senate-house and all the principal public offices, is a building of great extent, including a number of squares and inner courts with separate staircases and suites of apartments. One of these courts contains the botanic garden, which however has been much neglected of late. The College of Mines is a large edifice, built in a pure taste and magnificent style, but though finished hardly fifty years ago, it is falling to ruins, owing to some defect in the construction. It contains a rich collection of minerals, and in one of its rooms a professor gives lectures on chemistry and mineralogy. The Acordada, or great prison, is a substantial and large building, which will contain above 1200 prisoners. The hospital, now converted into artillery barracks, occupies a large site, and is well built. The university building is not distinguished by taste or magnificence; it contains a collection of Mexican antiquities, among which is the celebrated stone of sacrifice. The Academy of Arts, which is a fine building, contains a great collection of models, with casts of all the best statues of antient and modern times, and a school for drawing.

The numerous churches and convents with their cupolas and steeples give the town a magnificent appearance. The cathedral stands on the ruins of the great *teocalli*, or temple, of the god Mixitli. One part is low and of bad Gothic architecture; but the other, built in the Italian style, is very handsome. The interior is lofty, magnificent, and imposing. In the outer wall of this church is fixed the *kellenda*, a circular stone, covered with hieroglyphic figures, by which the Aztecs or Mexicans used to designate the months of the year, and which is supposed to have formed a perpetual calendar. Among the numerous convents that of San Francisco is distinguished by its extent, architectural beauty, and wealth.

The Alameda, or public walk, at the western extremity of the town, resembles a park: it is laid out in lines, diverging

from different centres, and is planted with a great variety of trees. In the centre is a fountain, which is supplied with water from the great aqueduct leading from S. Fé to the city. The water is carried along in trenches, so as to water the plants and trees, and is then discharged into the lake of Tezcuco. As the ground on which the city stands is low, all the roads leading to it are raised six or eight feet above its level; they are broad, paved in the middle, and planted on both sides with double rows of trees. These roads, called paseos, afford delightful rides.

As the water of the lake of Tezcuco is even salter than that of the Baltic, according to the experiments of Humboldt, and as the water which is found a few feet under the surface is also brackish, the city is supplied with drinkable water by two aqueducts, which bring it down from sources situated in the mountains west of the vale. The larger aqueduct, leading from S. Fé to the Alameda, and thence to the lake, is 11,155 yards long, and in one-third of its course is supported by arches of stone and brick plastered over. Its water, which is very pure, is distributed through the city. The other aqueduct, that of Chapoltepec, is 3608 yards long, and rests on 904 arches, which are nine and a half feet apart, and the columns four feet thick. The width is about six feet and a half. The stream of water is two feet and a quarter wide, and three feet deep. This water, which is less pure, is consumed in the suburbs contiguous to the city on the south.

The city is partly supplied with provisions and vegetables by small boats, which bring them over the lake of Tezcuco; but as the lake is very shallow in January and February, the supply is then generally stopped, and the city depends, especially for vegetables, on the supply by the canal of Iztapalapan, which leads from the lake of Xochimilco to the town. This canal is narrow, but always covered with small canoes loaded with fruits and vegetables: it passes through the chinampas, or floating gardens, which, in their present state, are long narrow strips of ground, redeemed from the surrounding swamp, and intersected by small canals. They are well cultivated, abound in fine vegetables, and their edges are planted with poplars. It is stated that they originally consisted of wooden rafts, covered with earth, and floated about in the lake when it was full of water, whence their name is derived. At present they are stationary, but it is said that there are still some floating gardens in the lake of Xochimilco.

The most remarkable object in the environs of Mexico is the palace of Chapoltepec, which is built on a rock, to the foot of which the water of the lake of Tezcuco extended at the time of the conquest by Cortes (1521). The palace, which was built by one of the viceroys of Mexico, is properly a fortress; but it is now in a very dilapidated state. The place is frequently visited by the natives and foreigners on account of the fine view it affords over the city and the greater part of the vale of Tenochtitlan. For the *teocallis* of Tezcuco, see MEXICAN STATES.

The population of Mexico amounts to between 140,000 and 150,000 souls, and consists mostly of Creoles, or descendants of Spaniards; the Mestizos, or descendants of Spaniards and Indians, not amounting to half that number. The lowest class of the people, called Saragates, Guachinangos, or Lepores, live in a state of abject poverty, which is owing to their indolent habits. They amount to about 30,000. The manufactures are not important, except those of plate and tobacco, which latter is carried on for the benefit of the government, as in all the Mexican states. Gold lace is also made. There are also a few manufactures of soap, cotton, and hats; but by far the greatest part of the manufactured goods for the consumption of the inhabitants are imported from Europe: silk stuffs, and especially stockings, also from China. The commerce of Mexico is limited to the importation of these foreign goods, and to the exportation of the produce of the mines. The city owes its present importance to the circumstance of being the residence of the federal government of the Mexican states, and of a great number of very wealthy individuals.

(Humboldt's *Essai Politique sur la Nouvelle Espagne*; Ward's *Mexico in 1827*; Poinsett's *Notes on Mexico*; Lyon's *Journal of a Tour in the Republic of Mexico; A Sketch of the Customs and Society of Mexico*.)

MEXICO, GULF OF, is a mediterranean sea, which is united by numerous straits with the Atlantic, from which it is separated by a row of islands and widely extended banks. The long chain of the Antilles forms its eastern boundary between 10° and 20° N. lat., and several small banks with the Great and Little Bahama Bank, extend along it from 20° to 26° N. lat. It is divided from the Pacific Ocean by the Mexican isthmus, which unites the two Americas. The length of the whole sea, from east-south-east to west-north-west, is not much short of 3000 miles. It is divided into two portions by the island of Cuba, which lies across the sea from east to west. Of these portions the southern, in modern times, has obtained the name of the Caribbean Sea, whilst that of Gulf of Mexico has been limited to the northern portion.

The Caribbean Sea, which extends from east to west nearly 2000 miles, or the distance from the British Islands across the Atlantic to Newfoundland, with an average breadth of less than 500 miles, is free from rocks and dangers to navigation between the Lesser Antilles and 80° W. long., except along the coast of Venezuela, where there are numerous steep rocks and islands which extend westward to 70°. West of 80°, and indeed from the innermost recess of the Gulf of Darien, the coast is lined by numerous reefs and low wooded islands, called keys, which in the Mosquito Gulf and the Bay of Honduras increase in number, and render navigation more intricate and dangerous. The Gulf of Mexico, or the northern portion of the mediterranean, is united to the Caribbean Sea by a strait about 120 miles wide, which is formed by Cape S. Antonio, the most western extremity of the island of Cuba, and Cape Catoche, the most northern point of the peninsula of Yucatan. The length of the Gulf, from Cape Sable in Florida to the eastern coast of Mexico, is more than 1000 miles, and its breadth towards the west more than 700 miles; but between Yucatan and Cuba, on the south, and the shores of Louisiana and Alabama, on the north, it does not exceed 550 miles. Shoals and small islands are rare within the body of the sea, and occur only along the northern coast of the island of Cuba and along the peninsula of Yucatan. Along the coast of Mexico the soundings are very regular, beginning at a distance of about 30 miles with 100 fathoms, and decreasing gradually as we approach the shores. At the eastern extremity, where the Gulf terminates in the old Bahama Channel and Florida Strait, the navigation is rendered very intricate by the Florida Reef, the Key Sal Bank, the Great Bahama Bank, and the numerous keys, shoals, and islets which surround the northern coast of Cuba.

The eastern trade-winds prevail in this sea during the summer from May to November, and on its eastern border along the islands all the year round. But along the coast of Venezuela and the shores of the Mexican isthmus the winds are subject to a regular change from November to April. In the Caribbean Sea calms and light winds succeed the trade-winds in November until the month of December, when the wind settles in the north-west, and varies only to the north up to the month of April. This wind blows in violent gusts and is attended with rain, but does not appear to extend beyond 12° 30′ N. lat., to the north of which parallel the trade-wind always blows. Calms and light airs in April indicate the change of the wind, which soon settles in north-east and east. In the Gulf of Mexico the *Nortes*, or northern gales, are much dreaded by navigators. They begin in September or October, and become prevalent in November: they blow with the greatest force in March, and sometimes last to the month of April. These violent gales generally blow three or four days in succession, and last sometimes ten or twelve days. They are interrupted by moderate winds from the east, which commonly last three or four days. At the setting in of a 'norther' the larger vessels, which cannot enter the shallow harbours of this coast, are obliged to slip their anchors and leave the shore.

The currents in this sea are mostly independent of this change of winds. A strong current sets into the Caribbean Sea from the Atlantic. In the wide strait between the islands of Trinidad and Grenada it runs from one to one mile and a half per hour, but not so quick in those which lie farther north, yet the rate is about twenty miles per day as far as the island of Dominica; it then diminishes gradually to ten and even eight miles, which latter rate occurs near the Virgin Islands. The strongest current within the Caribbean Sea is met with along the coasts of Venezuela and New Granada: it runs westward the whole year round as far as the Gulf of Venezuela, but west of that bay only from May to November. When the easterly wind ceases in November the currents begin to run to the westward some

days before the north-west winds come on, and continue to flow in that direction to the month of April. But in the Gulf of Darien, the most southern corner of the Caribbean Sea, the order of the currents is inverted; they run westward from December to April, and eastward from May to November. These currents extend only about 24 or 30 miles from the shores, and in the body of the sea they are always westerly, and commonly weak, except in January and February, when they run with great force. This westerly current turns northward in the strait between Cape S. Antonio and Cape Catoche, and carries the water into the Gulf of Mexico, in the western portion of which sea a strong northerly current, running about ten miles a day, is perceptible, even during the northers. But along the shores of Mexico, and at a considerable distance from them, no current is met with, except when the northers blow, when a strong southerly current runs along the shores; and to this circumstance is ascribed the formation of the numerous long-extended islands which line these shores, as also the bars which lie before the embouchures of the rivers. Near the mouth of the Mississippi river the northern current turns eastward, and afterwards to the south-east. At the western extremity of Florida Reef the current divides: the greater portion of the water, turning eastward, forms the Gulf Stream; while the remainder, running westward along the reefs called the Colorados, winds about Cape S. Antonio and Cape Corrientes, and returns to the Caribbean Sea. The Gulf Stream carries the water back to the Atlantic. [Atlantic Ocean.]

The Mexican Gulf may be entered by vessels through all the straits which divide the Lesser Antilles from one another; but navigators prefer the straits between Trinidad and Grenada, and between S. Vincent and S. Lucie, when they sail to the northern coast of South America. Vessels bound to Jamaica, Cuba, Mexico, and Louisiana, commonly choose the strait between Guadaloupe and Antigua; they rarely sail through the Mona Passage between Porto Rico and Haiti. But most of the vessels returning from these countries to Europe sail through the strait between Cuba and Florida, and follow the Gulf Stream, until they have entirely got out of the Florida Strait, when, turning eastward, they enter the Atlantic. Some vessels however, on leaving Jamaica and the countries farther south, direct their course to the Windward Passage between Haiti and Cuba, and thence to the Crooked Island Passage, by which they enter the Atlantic.

The Gulf of Mexico is remarkable for the high temperature of its waters. It raises the thermometer to 86°, while in the Atlantic, between the same parallels, the water does not exceed 77° or 78°. This high temperature is considered as the cause of the high temperature which the waters of the Gulf Stream preserve to a great distance from the Straits of Florida. In the centre of this sea, between the northern coast of Yucatan and the shores of Louisiana, great quantities of *fucus natans* are met with, extending in parallel lines from south-south-east to north-north-west. It was formerly supposed that the enormous quantity of this plant which is found in several parts of the Atlantic [Atlantic Ocean] was derived from this sea, and that it had been brought down by the Gulf Stream; whence it obtained the name of Gulf-weed: but at present it is thought that this plant grows on the bottom of the sea, in those parts where it is met with, and that at certain seasons it is detached from its root.

(Humboldt's *Personal Narrative, &c.*; Rennell's *Investigation of the Currents, &c.*; Ulloa's *Voyage to South America*; and Lyon's *Journal of a Residence and Tour in the Republic of Mexico.*)

MEYER, JAMES, was born on January 7, 1491, at Vletor, a village near Bailleul in Flanders, from which place, agreeably to the custom of his time, he took the name of Baliolanus. After acquiring the knowledge of antient languages, he came to Paris, and went through a course of philosophy and theology. Subsequently returning to Flanders he embraced the clerical profession, and establishing himself at Ypres, opened a school, which in a short time acquired great celebrity. On being appointed incumbent to the living of the church of Saint Donatien, he removed his school to Bruges, and finally renounced it to accept the curacy of Blankenburg, where he died on the 5th of February, 1552. His remains were carried to Bruges and interred at St. Donatien. His principal works are: 'Flandricarum Rerum Decus,' containing the origin, antiquity, nobility, and genealogy of the counts of Flanders; Bruges 1531, 4to.; and 'Chronicon Flandriæ, ab anno Christi 445 usque ad annum 1278,' Nürnberg, 1538, 4to.; 'Chronicles of Flanders, from the year 445 to the year 1278,' which was continued by his nephew to the year 1476, and published under the title of 'Annales Rerum Flandricarum,' Antwerp, 1561, fol.

MEYER, FELIX, was born at Winterthur in the canton of Zürich, in the year 1653. He studied first under an artist at Nürnberg, and afterwards under Ermels, a good landscape painter, whose manner he adopted. He went to Italy for improvement, but the climate not suiting his constitution, he returned to Switzerland. The beautiful and sublime scenery of that country supplied him with ample materials for numerous designs which deservedly gained him a high reputation and also fortune. To a lively and fertile imagination he added great facility of execution, of which he gave a remarkable proof at the abbey of St. Florian, in Upper Austria, where he happened to stop on his travels.

The abbot desiring to have two grand apartments painted in fresco, and having consulted another artist, who was very dilatory, asked Meyer for his advice as to the manner in which it should be executed. Meyer, after some minutes' consideration, took a long stick, to which he fastened a piece of charcoal, and immediately began to design, saying, 'Here I would have a tree;' which he sketched as quickly as possible; 'in the distance I would have a forest, thus; here a fall of water tumbling from great rocks, and so on;' designing as fast as he spoke, to the astonishment of the abbot, who immediately engaged him to undertake the work, which he entirely completed in the course of the summer. This adventure spread his reputation through all Germany, and from this time he was constantly employed by the princes and nobility.

In the latter part of his life he endeavoured to adopt a manner which should be at once more expeditious and more pleasing; but these latter performances are not equal to his earlier works, which give him a high place among the most eminent landscape painters. He was not skilful in drawing figures. His most esteemed works have figures by Roos or Rugendas. He died in 1713, at the age of sixty.

MEZEREUM. [Daphne.]

ME'ZERAI, FRANÇOIS EUDES DE, was the son of a surgeon named Eudes, and born in 1610, near Argentan, in the village of Rye. He studied in the university of Caen, and afterwards obtained the post of *Commis de Guerres*, which situation he subsequently gave up, and at Paris took the name of De Mezerai. Owing to great application he became dangerously ill, on which occasion the Cardinal Richelieu sent him 200 crowns, and the promise of his patronage. At Paris he produced his 'History of France,' which he afterwards enlarged by the introduction of verses, made by his friend Jean Baudoin, upon the principal persons of each reign; this latter edition had great success in 1646 and 1651; and a second and third volume appeared, both of which were equally fortunate. He also published several pamphlets directed against Cardinal Mazarin, under the name of Sandricour. An abridged edition of his 'History of France' appeared in 1668, and in 1662 his 'History of the Turks,' which is a translation from Chalcondylas. He succeeded Voiture in the Academy, and died in 1683.

Among other singularities, it is said of Mezerai, that he would shut himself up from the light of the sun at noonday, and in the middle of summer, pursuing his avocations by candle-light; and, as if fearful that this eccentricity would not be generally known, he lighted his visitors to the door.

Mezerai, besides the harvest reaped from his works, which much exceeded his expectations, had several foreign pensions. His merits as an author are exceedingly doubtful; for, according to the writer in the *Biographie Universelle*, the extraordinary success of his 'History of France' was, in a great degree, due to the number of engravings it contained, consisting of portraits of kings and queens, which however were inserted without much regard to historic truth. His style is sometimes coarse, but generally clear, distinct, and forcible. Voltaire observes, that he lost his pensions for having told what he thought to be the truth. The same author observes, that he is more bold than accurate, and that his style is unequal.

ME'ZIE'RES, a town in France, capital of the department of Ardennes, situated on the Meuse, in 49° 46′ N. lat.

and 4° 44′ E. long.; 121 miles in a direct line north-east of Paris, or 144 miles by the road through Soissons, Reims, and Réthel.

This town is chiefly remarkable for the strength of its fortifications. In 1520 or 1521 it was successfully defended by the Chevalier Bayard against an army under the count of Nassau, sent by the emperor Charles V. to besiege it. It was taken by the Prussians in 1815, after sustaining a long bombardment.

The town is built on the slope of a hill, and is washed both on the north and south sides by the Meuse, which here makes a bend to the west, in the form of a horse-shoe. The houses are ill built, and the public buildings little remarkable. There are three churches, an hospital, an arsenal, and a theatre. Altogether the town suffers by the contrast between it and the neighbouring town of Charleville, which is to the north of it, separated only by the Meuse, and is larger and more regularly laid out, and better built than Mézières. [CHARLEVILLE.] The population of Mézières, in 1831, was 3737 for the town, or 3759 for the whole commune; in 1836, it was 4083 for the commune. The inhabitants manufacture leather, which is in high repute, and carpenters' and other mechanics' tools: there are some breweries. Trade is carried on in leather, serge, hosiery, and linen cloth. Building stone, lime, and sand are abundant round the town. There are three yearly fairs. There are some fiscal and administrative government offices here and at Charleville. There are a society of agriculture, sciences, and arts; a public library; and courses of instruction in geometry and mechanics applied to the arts.

The arrondissement of Mézières has an area of 363 square miles, and comprehends 99 communes. It is divided into seven cantons or districts, each under a justice of the peace. The population, in 1831, was 62,737; in 1836, it was 69,294.

MEZZOTINTO, in engraving, a peculiar mode of engraving designs of any description upon plates of copper or steel, with the view of obtaining impressions therefrom. In this style of engraving, which essentially differs from every other, the surface of the plate is first indented or hacked all over by the action of an instrument something like a chisel, with a toothed or serrated edge, called a *cradle*, or mezzotinto *grounder*. This tool being rocked to and fro in many directions, indents or barbs the plate uniformly over its face, and produces what is called the mezzotinto grain or ground.

The barb, or nap, thus produced retains the printing-ink; and if in this state of preparation an impression were taken from the plate upon paper, it would be uniformly of a deep-black colour.

The directions, or *ways*, as they are technically called, given to the grounding-tool, are determined by a regulated plan, and for this purpose an ingenious sort of scale is used which enables the workman to pass over the plate in almost any number of directions without repeating any one of them. The mezzotinto ground being thus laid, it is at this period that the business of the artist properly commences. Having traced or drawn, with a pencil or other instrument, his outline upon the paper (unless indeed, as is sometimes the case, this should have been etched by the ordinary process, previous to the mezzotint ground having been laid), he proceeds to excise away the nap or ground, in conformity with the design, from all those parts which are not intended to be perfectly black in the impression. The instruments required for this purpose are scrapers and burnishers; with the former he scrapes away more and more of the ground in proportion to the brightness of the light, and the burnishers are used to produce perfect whiteness where it is required, as the high lights on the forehead or tip of the nose, or white linen in a portrait, &c. As the work proceeds it may be blackened with ink, applied with a printer's ball or otherwise, to ascertain the effect; after which the scraping may again be proceeded with, the artist taking care always to commence where the strongest lights are intended to appear.

The great facility with which mezzotintos are executed, as compared with line-engravings, will be obvious, seeing that it is much easier to scrape or burnish away parts of a dark ground corresponding with any design sketched upon it, than it is to form shades upon a white ground by an infinite number of strokes, hatches, or points, made with the *graver* or *etching-needle*. Herein consists the leading difference between this and all other modes of engraving; for while the process in each of these is invariably from *light* to *dark*, in mezzotinto it is from *dark* to *light*; and even the very deepest shades are produced, as we have seen, before the design is commenced. The characteristic or distinguishing excellence of mezzotinto engraving would seem to consist in the rich profundity of its shadows, the obscurity of which especially sympathises with fine effects of chiar'oscuro. It is therefore properly employed upon subjects where the quantity of dark predominates, as in the works of Rembrandt for example; and there can be little doubt that, had this process been known to that great master, he would have availed himself of it in multiplying his works. This opinion is sufficiently corroborated by the fact of his having sought and obtained the same effect, or nearly so, by leaving the *burr* on his etchings [ENGRAVING], which, retaining the printing ink, through a limited number of impressions at least, produced a result so nearly corresponding with mezzotinto, that many persons have been deceived by it, and led to attribute to Rembrandt van Rhyn the discovery of this more modern mode of procedure.

Having mentioned what we conceive to be the characteristic excellence of mezzotinto, viz. the richness and profundity of its shadows, it is but fair to add that its chief defect seems to be a corresponding poverty in the lights: and this objection will be felt to have much weight, when it is considered that it is to the lights in a picture that the eye is invariably attracted. On the lights therefore the line-engraver displays all that delicacy and beauty of line which agreeably irritates the eye and compensates for the absence of colour, by rendering the lights more interesting than the shadows. The lights in mezzotinto, on the contrary, where they occur in broad masses, have been ever felt by the judicious to be comparatively cold and poor. Of late however this objection has been much obviated by a judicious admixture of *etching* with the mezzotinto, which, by enriching the lights, has done much towards uniting the energies of both styles. Objection has also been taken to mezzotinto on account of the very limited number of good impressions which an engraving in this style would yield, in consequence of the very superficial nature of the ground. A work of this sort however was always susceptible of renovation by retouching, under more easy and satisfactory circumstances than one produced by any of the other modes; and latterly the introduction of steel plates, which are now commonly substituted for those of copper, has removed the objection entirely, a very large number of good impressions being thus ensured without the necessity of retouching. As copper-plates however are still occasionally used, it may be proper to state the respective numbers of good impressions that each may be expected to yield. On copper, the wear and tear of the plate much depend upon the number of *ways* it has been passed over in grounding, or the closeness of the teeth in the grounding-tool, the fineness of the grain depending upon these circumstances.

If the grain be not particularly fine, a copper-plate will furnish about one hundred and fifty good prints. When the plate begins to wear, the practice is to work it over again, partially, with the cradle; and afterwards to again have recourse to the scrapers, and in this way impressions of fifty at a time may be taken; so that by alternately retouching and printing by fifties, five hundred prints are frequently obtained from one copper-plate.

But from a *steel* plate eight or ten times that number may be obtained. The process is the same in the one case as in the other, but heavier *pressure* on the grounding-tool is requisite on a steel plate. A greater number of *ways* also is desirable, and these may be effected without rendering the subsequent engraving liable to more rapid deterioration, as would be the case upon copper. As many as ninety *ways* are frequently used on steel, while the number on a copper-plate varies from twenty-four to forty, which latter is rarely exceeded. It is scarcely necessary to say that steel plates, being especially liable to rust, require particular care in laying by.

From what has been said, it will be inferred that the manual operation of laying the mezzotinto ground is a very important, at the same time that it is a very laborious process. It is much to be wished that some means of effecting it by machinery could be devised; and we see no reason to doubt that this could be accomplished with equal and perhaps superior results to those obtained by the present mode of procedure.

The discovery of the art of engraving in mezzotinto has been a subject of some controversy, and, almost up to the time of our writing, of much uncertainty; but circumstances have recently transpired which we are among the first publicly to announce, and which enable us to set the matter completely at rest, and to give the honour of the invention to its real author, the rarity of whose productions has hitherto favoured the pretensions of one who has shown himself but too willing to strut in borrowed plumes. The account commonly given of its discovery is, that Prince Rupert, observed one morning a soldier engaged in cleaning from his musket the rust which the night-dew had occasioned, and perceived upon it, as he thought, some resemblance to a figure; it occurred to him whether or not, by corroding or grounding a plate all over in a manner resembling the rust, he might not afterwards scrape away a design upon it, from which impressions might be obtained. In short, it is said that he tried and succeeded, and thus became the inventor of mezzotinto engraving. If mezzotinto really had its origin in such circumstances as these, which is far from being improbable, they must have occurred to another rather than to Prince Rupert, since he was certainly not the discoverer of this art, as we shall presently show.

The merit of the discovery has been claimed by some authors (and even of late by a writer now living) for Sir Christopher Wren, on the ground of a communication which he made to the Royal Society in 1662, the Journals of which Society for October in that year record that 'Doctor Wren presented some cuts, done by himself in a new way, whereby he could almost as soon do a subject upon a plate of brass or copper, as another could draw it with a crayon upon paper.'

Previous to setting up the claims for Sir Christopher Wren, one would have thought that an ordinary spirit of research would have led his biographer to consult the engraved works in mezzotinto of Prince Rupert, which are not numerous, and, we believe, do not exceed twelve in number. He would then have found that his principal work (which is the Decollation of St. John the Baptist, after a design by Spagnoletto) bears date 1658, which is four years earlier than Sir Christopher Wren's communication to the Royal Society. In 1662, the year in which Sir Christopher Wren made this communication, the Royal Society was founded; and in the same year the celebrated John Evelyn (who was nominated by the king one of the original members, and of the council) published his 'Sculptura,' in which the first announcement of the new art, in England at least, appears; and he distinctly claims the honour of the invention for Prince Rupert, in a chapter 'on the new method of engraving, or mezzotinto, invented and communicated by his highness Prince Rupert, count palatine of Rhine,' &c. He embellishes the chapter with a specimen from the prince's own hand, and concludes it by alluding to an account of the process, which he is 'preparing to be reserved in the archives of the Royal Society;' and, as we have already seen, Prince Rupert's most capital performance actually bears date four years earlier: so that there is no pretence for giving the invention to Sir Christopher Wren on the ground of anything which he produced, or any communication which he may have made in 1662.

But while we have thus shown that the pretensions of Prince Rupert completely supersede those of Sir Christopher Wren, it remains for us to prove that those of Prince Rupert himself are invalid, and that he was guilty of an act of meanness in imposing upon John Evelyn, and this to the extent of allowing a man of his high character to impose in turn, however unconsciously, upon the world, by claiming for Prince Rupert the honour of an invention to which the prince well knew all the while that he had no title.

The real inventor of this art was Louis von Siegen, a lieutenant-colonel in the service of the Landgrave of Hesse Cassel, from whom Prince Rupert learned the secret when in Holland, and brought it with him to England, when he came over a second time in the suite of Charles II. Some curious and very rare prints recently purchased on the Continent, and now deposited in the British Museum, will enable us to place the claims of Von Siegen beyond doubt.

It is true that the Baron Heneiken long since ascribed the invention to its true author; and in his 'Idée Générale d'une Collection Complète d'Estampes,' printed at Leipzig in 1771, he distinctly asserts that Prince Rupert learnt the art from Von Siegen, whose first specimen made public was a portrait of the Princess Amelia-Elizabeth of Hesse. But although Baron Heneiken is an author of acknowledged credit, we must have continued to speak with caution on the subject, because we believe Baron Heneiken does not give the date of this engraving, nor profess to have seen an impression of it. In the collection however lately purchased for the British Museum there is an impression of this identical portrait, and it bears date 1643, which is *fifteen years anterior* to the earliest of Prince Rupert's dates. In the same collection there is another curious work by Von Siegen, a portrait of the queen of Bohemia, the date of which is also 1643, which we think places the question beyond all dispute. But there is among them one specimen which we regard as more curious than any of the others; for although without a date, it bears, we think, the most conclusive internal evidence of having been produced in the very infancy of the art, since it exhibits a total misconception or misapplication of its peculiar local powers, which, as we have said, are especially calculated for large masses of shadow of an indefinite character, such as a plain background to a portrait. Now the work to which we allude, which is a portrait of the princess of Orange the eldest daughter of Charles I., is a mixture of line-engraving and mezzotinto, and in it the background (which, if the mixed style be used, would be best effected by the mezzotint ground) is performed wholly in cross-hatches by the old process; while the flesh and even the hair, in which line-engraving might have been applied with advantage, are produced wholly by the new process of mezzotinto. There are works by Theodore Caspar Fürstenburg, who also probably learnt the art from Von Siegen, which bear date 1656, being earlier than anything by Prince Rupert; but the works both of Fürstenburg and Prince Rupert are engraved entirely by the newly discovered process of mezzotinto, and evince a more matured knowledge of its powers than those of its inventor Von Siegen.

We will only further add the remarkable fact that Von Siegen frequently attached the word 'inventor' to his works, of which we subjoin an instance in the inscription to a 'Holy Family,' engraved by him after Carracci, and one of his latest performances: 'Eminentissimo Principi Domino D. Julio Mazzarini, S.R.E., Cardinali, &c., novi hujus Sculpturæ modi *primus inventor* Ludovicus à Siegen humilissime offert, dicat et consecrat. A° 1657.'

It is not improbable, notwithstanding what we have said, that Prince Rupert, by himself or with the assistance of Wallerant Vaillant, an artist whom he retained in his suite, may have improved the mechanical mode of laying the mezzotinto ground; and it should also be stated that there is by Sir Christopher Wren a head of a blackamoor which is thought to have been done by a process differing from that of Prince Rupert. But these observations relate not to the principle of the art, but merely to the tool with which the *ground* is produced. The more perfect instrument at present used (i.e. the *cradle*) is said by Bartch to have been invented by Blooteling, a very skilful engraver in mezzotinto, who produced many of his works about A.D. 1672.

It is in our own country that mezzotinto engraving has been carried to the greatest perfection. The principal artists previous to the present century were James M'Ardell, Richard Houston, Valentine Green, Dixon, the two Watsons (Thomas and James), and one who contributed more perhaps to the improvement of this art than any one else, Richard Earlom, whose works, embracing almost every class of subject (history, portrait, still life, &c.), are well known, and are in almost every collection of importance in the country.

MHEYSIR. [HINDUSTAN, vol. xii., p. 211.]

MIAMI. [OHIO.]

MIASMA is a Greek word (μίασμα) signifying pollution or corruption generally; and is employed to designate a certain volatile deleterious principle, arising either from the bodies of the sick, from animal or vegetable substances, or from the earth, and capable of exerting a morbid influence on those exposed to its action. To the terrestrial emanations the Italians have given the name of Malaria (from *mala* and *aria*, bad air), and this word has been generally adopted into other languages: to those emanations arising from the bodies of the sick, the term contagion is more properly applied. In common parlance then, miasma is seldom employed to designate the contagious effluvium of disease; but, with the adjunct marsh, is restricted to the sense in which malaria is used; hence we speak of marsh miasma and malaria as one and the same thing. Though marshes,

whether salt or fresh, are prolific sources of malaria, they are by no means the only sources; the mud which is left by the drying of extensive ponds and lakes, the half-wet ditches of fortifications, and neglected sewers and drains, are capable of furnishing this poison. The decomposition of vegetable matter, in other circumstances than in connection with soil, is likewise capable of producing it; this has been exemplified in the sickliness of ships from the leakage of sugar into a damp hold. The fever which made such fearful ravages among the crew of the Priamus frigate, arose from the action of bilge-water on chips and shavings left in the hold. Having enumerated some of the sources of miasma, the question naturally suggests itself,—what are the conditions essential to its development? The mere name of marsh miasma suggests the idea of stagnant water, and if the preceding enumeration of circumstances under which the production of malaria takes place be examined, it will be found that vegetable matter and moisture are present in all the examples, and that animal matter is so occasionally. But how great soever may be the share which moisture has in its production, it is certain that only a very small proportion is necessary: a marsh, the whole surface of which is thoroughly wet, is comparatively innocuous; but if partially or entirely dried by the summer's heat, it becomes extremely pestilential in autumn; indeed malaria, in its most intense degree, has been met with in low lands which had become as dry as a brick ground, with the vegetation utterly burnt up, and hence a high temperature seems to be another agent necessary, or at least favourable to its development. According to Dr. Ferguson, the only condition indispensable to the production of marsh miasma on all surfaces capable of absorption, is the paucity of water where it had previously recently abounded, a rule to which he assures us there is no exception in climates of high temperature. Of the chemical and physical properties of malaria nothing is known, even the very obvious question whether it is always the same kind of poison, or whether a multiplicity of these may not exist, is one which the present state of our knowledge does not enable us to answer. The occasional existence of putrefaction in conjunction with malaria is an accidental concomitant, but by no means essential to its activity as a poison. With regard to the effects of malaria, these manifest themselves in a longer or shorter period after exposure to its influence, and consist chiefly in the production of intermittent, remittent, and yellow fevers, dysentery, and typhus. The long-continued application of the same poison in a diluted form gives rise to various disorders of minor import, gradually undermines the constitution, and produces premature old age; even the inferior animals and vegetables partake of the general depravation which characterises malarious districts. The most efficient means of preventing the generation of the malarious poison, and, by consequence, the diseases to which it gives rise, are, the draining of swampy lands, and preventing the accumulation of putrid or putrescible vegetable or animal matter.

MIAZZI, GIOVANNI, an Italian architect of the eighteenth century, born at Bergamo, in 1699, was originally brought up to his father's trade of carpenter. He was almost entirely self-educated in the profession which he afterwards followed; for it was not till he was forty that he availed himself of the instructions of Preti, who was his junior by two years. He had however previously built a small theatre in his native town, and the church of La Trinità in the Borgo of Angarano. One of his later and best works is the church of S. Giambattista at Bassano, in which he successfully overcame the numerous obstacles arising out of the site and the conditions he was obliged to comply with. He also built the collegiate church at Schio, that at Valdagno, another at San Vito, and a fourth at Simonzo, besides that at the convent of Monte Gargano, in Puglia. The Spineda palace, at Venegazza, in the Trevegiano, excited much admiration for the elegance of its design, which has since been greatly impaired by the demolition of the chapel and corresponding wing, and the arcades uniting them to the central edifice. The beautiful theatre at Treviso is another of his works; for although the original design proceeded from Bibbiena, he greatly improved it; and the façade, the vestibule, and many of the internal arrangements are entirely his own. Miazzi died about 1780, and, notwithstanding his age, continued vigorous and active almost to the last.

MICA. [LEPIDOLITE; MARGARITE; ODERIT.]

MICA SCHIST, one of the earliest groups of stratified rocks known to geologists, and very extensively distributed throughout the mountain regions of the globe, often in contact with granite, but more frequently superposed on gneiss. It is frequently interstratified with gneiss, primary limestone, quartz rock, chloritic schist, and clay slate, and is deficient in organic remains. There are however certain more recent assemblages of strata more or less allied to mica schist in composition, of very limited area, adjacent to granitic elevations, in Dauphiné, &c., which do contain organic remains of the secondary periods.

To the British geologist the southern Highlands of Scotland and the mountains of Donegal offer abundant and striking examples of mica schist, with its associated limestones, quartz rocks, &c., while round the granites of the Isle of Man, Cumbria, Devon, and Cornwall, hardly a trace of gneiss or mica schist has been observed.

Composition. Mica schist, in its most typical state, differs from gneiss by the absence of felspar, but among the early stratified rocks the gradations and permutations of ingredients are so frequent as to confound all merely mineral distinctions, from hand specimens. The mica is usually spread through the rocks of this series in continuous surfaces overspreading the quartz portions, whereas in gneiss this seldom happens. In respect of the magnitude, relative abundance, and crystalline aspect of the ingredients of mica schist, there is every possible variation, so that some specimens approach obscurely to granite, others to well defined gneiss, and others to clay slate.

Dr. M'Culloch, a good authority on subjects of this nature, proposed the following synopsis of micaceous schist.

Division I. Consisting of mica and quartz.

Subdiv. 1. Simply laminar or foliated.

a. Composed principally of continuously laminar mica.
b. Composed principally of continuously laminar quartz.
c. The mica discontinuous, the quartz granular.
d. The mica greenish, approaching to chloritic schist.
e. Mica grey, approaching to talcose schist.
f. Approaching to clay slate.

The rocks of this subdivision are frequently and remarkably contorted.

Subdiv. 2. Granularly laminar.

a. Granular quartz, with scales of laminar mica.
b. Laminar quartz, with mica in scattered spots.
c. Laminar quartz, with distinct scales of mica.
d. Laminar quartz, with mica in parallel lines, so as to appear fibrous on splitting. (Avanturine seems to be of this nature.)
e. The mica bent and contorted round the grains of quartz.

Division II. Compounded of three or more ingredients.

a. With hornblende.
b. With felspar (passing to gneiss).
c. With chlorite or talc (passing to talcose or chlorite schist).
d. With more than one of these ingredients.
e. With carbonate of lime.

Division III. Conglomerated, or containing superadded fragments of granite, gneiss, limestone, &c. (In Isla, Garveloch, Rannoch, &c.)

Besides the minerals above noticed, many others occur in mica schist, so as universally to modify its aspect. This is particularly the case with garnet, which is often perfectly crystallized amidst the mass of fragmentary mica and quartz, and is so frequently met with in mica schist, that it seems to mark a particular condition through which the rock has passed since its first deposition.

The circumstance which perhaps more than any other deserves attention in studying these rocks, is the character of their stratification. Where limestones or clay-slates alternate with the mica schist, its strata are easily traced; but in cases where entire mountains are formed of laminated mica and quartz, the contortions to which the whole is subject render it very difficult to determine the prevalent dip of the beds.

It is difficult to avoid the belief that the smaller contortions of gneiss and mica schist are due to causes quite distinct from violent movement; they are characteristic of a peculiar mode of deposition, or marks of a subsequent modifying process; whether the great contortions may be thus explained, or require the supposition of great disturbances of position, is not easy to determine. [GEOLOGY; ROCKS.]

MICAH (מִיכָה), one of the twelve minor Hebrew pro

phets, is called in the title to his prophecy the Morasthite, and thus he is distinguished from Micaiah, the son of Imlah, who prophesied the death of Ahab, about B.C. 897. (1 *Kings*, xxii. 8-28.) This appellation was probably derived from his birthplace, Moresheth-Gath (*Micah*, i. 14), or Mareshah, a city of the tribe of Judah. (*Micah*, i. 15; *Josh.*, xi. 44; 2 *Chron.*, xi. 8; xiv. 9-10.)

From the title to the book of Micah we learn that he prophesied in the days of Jotham, Ahaz, and Hezekiah, kings of Judah, or from 759 to 699 B.C. The kings of Israel during this period were Pekah and Hoshea. Thus Micah was contemporary with the latter part of Hosea's prophetical ministry, and with Isaiah. This date is confirmed by a reference made to the prophet by Jeremiah (xxvi. 18, 19), who quotes his prophecy respecting the destruction of Jerusalem (*Micah*, iii. 12), and says that it was uttered by Micah in the days of Hezekiah. He must have delivered his prophecy before the sixth year of Hezekiah (B.C. 722), in which the kingdom of Israel was destroyed, for he speaks of that calamity as a future event. (*Micah*, i. 6, &c.)

Hartmann contends that Micah prophesied after the fourteenth year of Hezekiah, and that the book which bears his name is a collection of different prophecies made during the Babylonish captivity, some of which are Micah's, and others not. (*Micah, neu übersetzt und erläutert*, Lemgo, 1800.) This hypothesis, which is totally at variance with all the testimony we have on the subject, and is not sustained by internal evidence, on which it professes to be founded, has been amply refuted by Jahn (*Einleitung*, vol. ii., p. 430) and Rosenmüller (*Scholia in Vet. Test., Proœm. in Mic.*).

Micah prophesied both to Israel and Judah (i. 1). He begins by predicting the overthrow of both nations, upbraids them with their cruelty, injustice, and impiety, and concludes this part of the book with the striking prophecy of the destruction of Jerusalem, which Jeremiah quotes, and which some suppose to refer to the taking of the city and the razing of the temple by the Romans. (chaps. i., ii., iii.) He next prophesies the restoration of the people to Jerusalem (iv. 1-8), after they shall have been carried captive to Babylon (iv. 9, 10), and the destruction of their enemies (iv. 11, 13). He foretels the birth of the Messiah at Bethlehem, after great calamities (v. 1-3), his ministry, and final triumph (v. 4-15). In chap. vi. he again reproves the people for their ingratitude, irreligion, and injustice. In chap. vii. Jerusalem is represented as complaining of the corruption and faithlessness of her sons, but patiently waiting for deliverance from God (ver. 1-10). The prophet consoles her with the promise of her restoration (ver. 11-13), and concludes his book with a sublime prayer to God for the fulfilment of that promise (ver. 14-20).

'The style of Micah,' says Bishop Lowth, 'is for the most part close, forcible, pointed, and concise, sometimes approaching the obscurity of Hosea, in many parts animated and sublime, and in general truly poetical.' (*Prælect.*, xxi.)

The canonical authority of this book is undisputed. One of the most remarkable predictions in it (v. 2) is quoted in the New Testament as being understood by the Jewish priests and scribes to refer to the birth of the Messiah. (*Matt.*, ii. 6.)

(Rosenmüller's *Scholia in Vet. Test.*; the Introductions of Eichhorn, Bertholdt, Jahn, De Wette, and Horne; *The Minor Prophets*, by Newcome and Horsley; *Micah, übersetzt und erläutert*, von K. W. Justi, Leipz., 1820.)

MICHAEL'S MOUNT. [CORNWALL.]

MICHAEL, SAINT. [AZORES.]

MICHAËLIS, JOHN DAVID, was born at Halle on the 27th of February, 1717. His father, Christian Benedict Michaëlis, was professor of theology in the university of Halle, and a distinguished Hebrew scholar. After receiving instruction for some time from private tutors, Michaëlis spent four years in the orphan school at Halle, where his attention was particularly directed to languages and philosophy. In 1733 he began to attend the lectures at the university, and it was here that he obtained from the chancellor Ludwig's lectures on German history the foundation of that knowledge of general law and of the constitution of society which was afterwards displayed in his 'Mosaisches Recht.' After taking his degree in 1740, he visited England, where he made the acquaintance of several eminent scholars both in London and in Oxford. During part of his residence in England he preached at the German chapel in St. James's Palace. On his return to Germany he devoted himself to the study of history, Oriental languages, and biblical criticism. At the death of the chancellor Ludwig, Michaëlis was commissioned to arrange and catalogue his immense library. The catalogue was published in 1745, and is considered a model for such works.

In 1745 he went to the university of Göttingen at the invitation of Münchhausen; and there he spent the rest of his life, although he was invited by Frederick the Great, in 1763, to return to Prussia. To the university of Göttingen Michaëlis rendered the most important services, as professor of theology and Oriental literature from 1745 to 1791; as secretary and director of the Royal Society of Sciences, from 1751 to 1770, when he left it on account of some differences with the members; as editor of the journal entitled 'Gelehrte Anzeigen' from 1753 to 1770, and as librarian and director of the philological seminary, which would have been abandoned after the death of Gesner in 1761, if Michaëlis had not consented to direct it gratuitously.

In order to throw new light upon biblical science, Michaëlis planned the expedition to Arabia and India which was conducted by Carsten Niebuhr. The first project of this enterprise was submitted in the year 1756 to the Baron von Bernstorff, then minister of Frederick V., king of Denmark. The choice of the travellers was entrusted chiefly to Michaëlis, who drew up a series of questions for their guidance.

In 1775 Michaëlis was made a knight of the Polar Star by the king of Sweden; in 1786 he was appointed an Aulic counsellor of Hanover, and in 1789 he was elected a Fellow of the Royal Society of London. He died on the 22nd of August, 1791. He was twice married; by his first wife he had only one son, Christian Frederic; by his second he had nine children, of whom one son and three daughters survived him.

The mind of Michaëlis was strongly characterized by independence. He always acted in the spirit of his motto 'libera veritas.' But his love of independence often led him to undervalue the labours of other learned men, and to do injustice to some of his most distinguished contemporaries. He often appeared to delight in discovering difficulties solely that he might have the pleasure of removing them. In the examination of the Old Testament he treated the Masoretic traditions with a contempt hardly less extravagant than the reverence entertained for them by the school of Buxtorf; and in every department of criticism he was apt to hazard ingenious conjectures in opposition to all real evidence. Though a good Hebrew scholar, he never possessed an accurate knowledge of the classical languages, and his acquantaince with Arabic was superficial. Notwithstanding these defects, his contributions to biblical and Oriental learning are invaluable, especially when he treats of subjects capable of illustration from history and philosophy. His religious opinions were never firmly fixed, but he invariably expressed the greatest reverence for the Scriptures.

The works of Michaëlis are very numerous; the following are some of the most important. In Oriental literature, grammars of Hebrew, Chaldee, Syriac, and Arabic, and treatises on various subjects connected with these languages; 'Oriental and Exegetical Library,' 24 vols., New do. 8 vols.; 'Supplementa in Lexica Hebraica,' 6 vols. In philosophy, an essay 'On the Influence of Opinions on Language and of Language on Opinions,' which obtained a prize from the Prussian Academy of Sciences in 1759; a treatise on moral philosophy, and other works. In history, geography, and chronology, 'Spicilegium Geographiæ Hebræorum exteræ post Bochartum;' other treatises on geography and chronology; several separate dissertations on the laws and antiquities of the Jews, the substance of most of which is embodied in his 'Mosaisches Recht,' in 6 vols., 1770-75; a second edition of the first 5 vols. of this work was published in the years 1775-80. This work, which is considered the masterpiece of Michaëlis, was translated into English by Dr. Alexander Smith, in 4 vols. 8vo., 1814, under the title of 'Commentaries on the Laws of Moses.' 'The great object of Michaëlis in this work is to investigate and illustrate the philosophy of the Mosaic laws, to show their wonderful adaptation in every respect to the very peculiar circumstances in which the people to whom they were given had been placed by providence; and, while he

takes every opportunity of establishing the claims of Moses to the character of an ambassador from heaven, to inculcate upon human legislators the important lesson of studying those particulars respecting the nature and political situation, the ideas and prejudices, the manners and customs of their countrymen, by attention to which alone they can ever hope to make them virtuous, prosperous, and happy.' (Dr. Smith's *Preface*, p. xvii.) In biblical criticism Michaëlis's *Introduction to the New Testament* is well known in England by the translation of the late Bishop Marsh; he also published part of an 'Introduction to the Old Testament;' a 'Translation of the Bible, with Notes, for the Unlearned,' and several other critical works. (Professor Hassencamp's *Collection of Memoirs relating to the Life and Writings of Michaëlis;* and *Biog. Univ.*, vol. 28.)

MICHAELIS, JOHN BENJAMIN, one of the minor classic poets of Germany, was born at Zittau on the last day of the year 1746. Though he had no other instruction than what the gymnasium of his native place afforded (for his father, who was a clothmaker, had suffered so much in his circumstances by the war, as to be unable to send him elsewhere), his natural abilities, seconded by a happy memory, stood him greatly in lieu of a regular classical education. Having made himself a complete master of Latin, he went to Leipzig with the intention of applying himself to the study of physic, but soon desisted from it as one for which he had no relish, and applied himself to poetry. At the recommendation of some of his friends, but far more out of necessity, he published a volume of poems in 1766. These first proofs of his poetical talent obtained for him the encouraging notice of Gellert, Weisse, and Oeser; the last-mentioned of whom interested himself warmly in his success, and earnestly recommended him to Gleim, who was afterwards his truest patron. In 1770 he was invited to undertake the editorship of the 'Hamburg Correspondent;' but he soon relinquished the office, which, alluring as it appeared at first, soon proved too irksome for him. While at Hamburg however he became acquainted with Lessing, who exerted himself to serve him, and obtained for him the situation of stage-poet in Seyler's company; but his nervousness and ill state of health soon compelled him to give it up. He now determined to avail himself of the generous proposal which Gleim had previously made him, to take up his residence with him, and make his house a permanent home. By Gleim he was welcomed as if rather conferring an obligation than receiving one; and thus suddenly placed in ease and comfort, and in the society of such men as Jacobi and Lichtwer, nothing further was left him to wish for, except that he might continue to enjoy his happiness. Unfortunately he became subject to a spitting of blood, which carried him off, September 30th, 1772, in the twenty-fifth year of his age.

In the favourable circumstances in which he was latterly placed, there is no doubt but that, had longer life been granted him, he would have distinguished himself among the writers at the close of the eighteenth century. The productions he left are to be considered merely as the blossoms of poetical talent. The principal ones among them are his satires, fables, and tales, and poetical epistles; and they afford proof not only of literary talent, but of the excellence of his moral character.

MICHAELMAS, the feast of St. Michael the archangel, 29th of September. Brady says it was first established in 487. Michaelmas-day is one of the regular periods, in this country, for settling rents; and an old custom is still in use of having a roast goose to dinner on that day, probably because geese are at this time most plentiful and in the highest perfection. Beckwith, in the last edition of the 'Jocular Tenures,' p. 223, says, 'Among other services, John de la Hay was bound to render to William Barnaby, lord of Lastres in the county of Hereford, for a parcel of the demesne lands, one goose fit for the lord's dinner on the feast of St. Michael the archangel. And this as early as the tenth year of king Edward the Fourth.' ('Lastres,' *Rot. Cur.*, 10 Edw. IV.)

Martin, in his 'Description of the Western Islands of Scotland,' p. 213, speaking of the Protestant inhabitants of Skie, says, 'They observe the festivals of Christmas, Easter, Good Friday, and that of St. Michael's. Upon the latter they have a cavalcade in each parish, and several families bake the cake called St. Michael's bannock.'

(Brady's *Clavis Calendaria*, vol. ii., p. 175-180; Brand's *Popular Antiquities*, 4to. ed., vol. i., p. 291-298.)

MICHAUX, ANDRE', was a French botanist, who visited Syria, Persia, and North America, at the latter part of the last century, in all which countries he made considerable collections of dried plants. He is chiefly known as the author of a valuable account of the oaks of North America, published in folio, at Paris, in 1801, and of the 'Flora Boreali-Americana,' which appeared in 1803, in two volumes 8vo. Of the latter work he is said to have been less the author than the late Professor Louis Claude Richard.

MICHAUX, FRANÇOIS ANDRE', son of André, was employed by the French government to explore the forests of North America, with a view to the introduction into Europe of the valuable timber-trees of that country. For this purpose he made three voyages to the United States, during which he succeeded in sending to France large quantities of seeds. His principal work is the 'Histoire des Arbres forestiers de l'Amerique Septentrionale,' in 3 vols. large 8vo., Paris, 1810-1813; this is an excellent account of the principal North American forest trees, abounding in valuable information as to their geographical distribution and botanical distinctions, and the uses and qualities of their timber. Besides these, he published a treatise 'On the Naturalization of Forest Trees in France,' 8vo., Paris, 1805; 'Journey to the West of the Alleghany Mountains,' 8vo., Paris, 1804; and 'A Notice of the Bermudas,' 4to., Paris, 1806.

MICHELOZZI, MICHELOZZO, an eminent Florentine sculptor and architect of the sixteenth century, was a pupil of Donatello, and was patronised by Cosmo de' Medici, to whom he was so attached, that on the latter being banished, in 1433, he chose to follow him. It was for Cosmo that he erected the edifice since denominated the Palazzo Riccardi at Florence, a noble monument of the older Florentine style, simple even to severity, yet possessing an air not only of grandeur, but of magnificence. The façade consists of a lofty rusticated basement, with comparatively small apertures, above which are two ranges of large arched windows, seventeen on a floor, and each divided into two lesser arches resting on a central column. The whole is crowned by a very rich cornicione. The interior court has upper and lower porticos or galleries, with arches resting upon columns, and with an enriched frieze between the first and second arcades. He also greatly improved the court of the Palazzo Vecchio, originally built by Arnolfo, and which is in a rich though somewhat fanciful style inclining to Gothic. Among his other works at Florence is the Palazzo Tornabuoni, now Corsi; and in the neighbourhood of that city the villas Cafaggiuolo and Carregi; also a palace at Fiesole, for Giovanni de' Medici, son of Cosmo I. During the time of his residence at Venice he made designs for many public and private buildings in that city, and erected there the celebrated library in the convent of San Giorgio. He was likewise employed by his patron Cosmo in enlarging and embellishing a palace at Milan, bestowed on him by Ludovico Sforza. His last work was designing and superintending the execution of the monumental chapel of the Annunciation, erected by Piero de' Medici in honour of Cosmo, in the Chiesa dei Servi, at Florence.

Michelozzo died at the age of sixty-eight, but the precise time of his decease is not known—probably it was about 1470.

MICHIGAN, a portion of the United States, which hitherto has been governed as a territory. The peninsular part of it will soon form a member of the Union, if it has not already been constituted an independent state; and the western part will remain a territorial government. The peninsula lies between 41° 35′ and 45° 50′ N. lat., and between 82° 35′ and 86° 50′ W. long. This part, which will form the state, is about 280 miles long, and on an average 150 miles wide, and is stated to have an area of 34,000 square miles, or about 5000 square miles more than the area of Scotland. Michigan is a peninsula, the western side of which is washed by Lake Michigan in all its length, or about 280 miles. The strait of Michilimackinac, which unites Lake Michigan with Lake Huron, and the north-western portion of the last-mentioned lake, surround the peninsula on the north. On the east extends Lake Huron, as far south as 43° N. lat. where it forms a deep bay, called Saginaw Bay, and constitutes, from the Strait of Michilimackinac to the outlet of the river St. Clair, a coast line of more than 260 miles. South of 43° N. lat. the boundary is formed by the river St. Clair for about 30 miles, and by the lake of St. Clair for about the same length. The river Detroit then becomes the boundary to its embouchure in Lake Erie, a distance of

about 30 miles. Lake Erie washes the eastern shores of Michigan for about 40 miles. In the south the peninsula is divided by an imaginary line from the states of Ohio and Indiana. The boundary-line of Ohio runs along 41° 35′ N. lat. for about 80 miles, and that of Indiana along 41° 45′ N. lat. for about 110 miles.

Surface and Soil.—The interior of the peninsula forms a plain which has generally a level surface, but in some districts is undulating or intersected with low hills. This tract is probably about 200 feet above the lakes, and the surface of the lakes is nearly 600 feet above the sea-level, so that the greatest part of Michigan is probably about 800 feet above it. The highest land seems to traverse the peninsula towards its southern extremity in a south-west and north-east direction, and to terminate on the east of Saginaw Bay with the smaller peninsula of Sanilac. The surface of this part is more undulating than other parts, and intersected by a great number of small lakes. The soil is said to be rather fertile. The slope of this high land towards the lakes Erie and St. Clair, and the straits of Detroit and St. Clair, is long and hardly perceptible. This is probably the most fertile district of the country; it contains little prairie land, except on the alluvial tracts near the mouths of the rivers and along the lakes, which are in some parts marshy but fertile. Nearly the whole of the remainder of the country is covered with trees of a heavy growth. The slope towards Saginaw Bay along Saginaw river and its numerous branches is of a similar character: but the peninsula of Salinac has a poor soil and is mostly sandy. The larger peninsula, between Lake Huron and Lake Michigan, is less known. It is however certain that it contains no mountains, nor even high hills. A great portion of it is prairie-land, intersected with numerous swamps, at least in the southern districts which have been explored. The shores of both the great lakes are poor and sandy; and along the shore of Lake Michigan there are sandy eminences, formed near the mouths of the numerous small rivers which join the lake, by the action of their current against the swell of the lake: the adjacent tracts are of very inferior fertility.

Rivers.—As the rivers of the peninsula descend from the table-land to the great lakes, they have a short course. On the table-land they run slowly, but on the declivity their course is accelerated and interrupted by rapids. The most important are St. Joseph's river and Saginaw. St. Joseph's river falls into Lake Michigan, not far from its southern extremity, after a winding course of about 200 miles. Though rather rapid, it is said to be navigable for boats through nearly the whole of its winding course. The Saginaw river is formed by a great number of branches, which descend from the table-land lying to the east, south, and west of the depression in which it flows, and which may be considered as a prolongation of Saginaw Bay. Some of these branches flow fifty miles before they unite. After their union, the river takes the name of Saginaw, and is navigable for boats to its mouth, a distance of twenty-five miles. The rivers St. Clair and Detroit, as well as the lakes of Michigan, Huron, St. Clair, and Erie, are noticed under CANADA (p. 208, 209).

Climate.—The climate of this country is severe. The winter generally begins in the middle of November and lasts to the middle of March. The ice on the rivers and borders of the lake is strong enough to admit travelling on sledges. Though situated on both sides of 45° N. lat., its climate resembles that of southern Sweden (57° N. lat.). This circumstance is mainly to be attributed to the elevation of the surface, and also to its not being sheltered by any range of mountains against the cold northern and north-western winds which blow over the immense plains that stretch northward to the shores of the Polar Sea. The surrounding lakes, though large, are still too small to moderate in any sensible degree the coldness of these winds. Lake St. Clair is frozen over every year from December to February. The summers are never hot, but subject to considerable changes. In the hottest days the thermometer rises to 70°, but in the evening and morning it is as low as 46°. The climate is rather dry, and the quantity of snow which falls not considerable.

Productions.—Wheat, maize, and potatoes are grown to a great extent; oats and buckwheat are not so extensively cultivated. Other vegetables thrive very well. The country along the Strait of Detroit is famous for its orchards, which the French settlers have planted, and which are extensive and well managed. A great quantity of cider is exported. The most common trees are ash, beech, cedar, cherry-trees, elm, hickory, maple, oak, pine, poplar, aspen, and walnut. Around the lakes of the table-land and near the mouth of some rivers large tracts are covered with the wild rice (*Zizania aquatica*), on which immense flocks of water-fowl of different species feed. Of domestic animals cows are most numerous. The wild animals are the elk or moose-deer, deer, wolves, foxes, wild cats, otters, martens, racoons, opossums, squirrels of different kinds, and musk-rats. Beavers are only found on the rivers which fall into Lake Michigan. Fish abound in the lakes and rivers, but not in Lake Michigan. Wild turkeys and pigeons are abundant.

Inhabitants.—There are few settlements of the whites north-west of a line drawn from the mouth of St. Joseph's river to that of the Saginaw. The whole tract lying north of it is chiefly in possession of the aboriginal tribes of the Ottawas and Miamis, who, with some Pottowatamis and Chippewas, have in some places villages within the range of the country inhabited by the descendants of Europeans. These Indians generally cultivate maize, and some of them wheat and vegetables; they also raise horses, cattle, hogs, and poultry. The population of these tribes may amount to about 9000. That of the whites was estimated in 1810 at 4700, in 1820 at 10,000, and in 1830 it amounted to 31,670 souls, and according to an enumeration presented to Congress in 1834, it amounted to upwards of 90,000 within the limits of the proposed state, which is a greater relative increase than any other state or territory in the Union has had in the same time. There are a few coloured individuals.

Political Division and Towns.—The country settled by the whites is divided into 35 counties. The only place of importance is Detroit, built not far from the efflux of the river of the same name from Lake St. Clair. It is the seat of government, and contains above 3000 inhabitants, mostly of French origin: it is also the principal deposit for the cider, grain, and furs, which are sent from this place mostly to Cleveland in Ohio, and to Maldon in Upper Canada. It also carries on a considerable trade with the Indians. Mackinac, or Mackinaw, on the island of Michilimackinac (about nine miles in circuit), contains about 100 houses, and has a good harbour. It is the great place of resort for the Indians both for the sale of their furs and for receiving the annuities paid them by the United States. There is daily communication by steam-boats between Detroit and Buffalo in New York, a distance of above 300 miles. Many of the oldest inhabitants are of French extraction, but the largest part of the population consists of emigrants from New England.

History.—Early in the seventeenth century the French penetrated into this country from Quebec. In 1670 they founded Detroit. In 1783 Michigan was included in the limits of the United States, but not actually given up by the British until 1796. In 1805 it was formed into a territory. (Darby's *View of the United States*; &c.)

MICHIGAN, Lake. [CANADA.]

MICIPPA. [MAIIDÆ, vol. xiv., p. 300.]

MICKLE, WILLIAM,* was born in the year 1734, at Langholm in Dumfriesshire, where his father was a Presbyterian minister. At the age of sixteen he was sent to the counting-house of a relation, who was a brewer, and remained there five years. He afterwards set up business on his own account, but failed, it is said, because he devoted those hours to his poetical studies, which should have been dedicated to business. He subsequently became corrector of the Clarendon Press in Oxford, and though several of his juvenile poems had been printed, his name remained unknown to the public till the publication of an elegiac ode called 'Pollio,' in 1765. This was followed in 1767 by a poem in imitation of Spenser, called 'The Concubine,' published with many corrections and additions ten years afterwards under the title of 'Sir Martyn.' He also wrote, besides several other poems, a 'Letter to Dr. Harwood,' against the Arian views; an attack on Deism, called 'Voltaire in the Shades;' and a tragedy entitled the 'Siege of Marseilles,' which was refused by Garrick, Harris, and Sheridan in succession, and never produced. In 1775 came out his translation of Camoens's 'Lusiad,' which had occupied him five years. Governor Johnstone, his patron, having been

* Sometimes called William Julius Mickle, but the second name was merely assumed by the author himself.

appointed commander of the Romney man-of-war, took him out to Lisbon, where he was appointed joint-agent for the prizes that might be taken in an expected cruise. His translation procured him much respect among the Portuguese, and he was admitted a member of the royal academy, of which Prince Don John of Braganza was president. A poem called 'Almada Hill' was a result of his residence at Lisbon. After Mickle's return to London with Governor Johnstone, he wrote several pieces both in prose and verse, the last of which was 'Eskdale Braes,' a ballad. He died at Wheatly in Oxfordshire, in 1789

His translation of the 'Lusiad' has been severely censured on account of the liberties taken with the original, and the unwarranted diffuseness of the translation. Mickle's poems as a whole are worth little, indeed so little, that we may wonder how they acquired the small celebrity which they have attained. A ballad by Mickle entitled 'Cumnor-Hall' is not without merit; it furnished the idea of Sir W. Scott's 'Kenilworth,' and is printed in the introduction to that work in the late complete edition of Scott's novels.

MICO, or Fair Monkey, one of the common names for that species of *Ouistiti* (*Hapale* of Illiger) known to zoologists as the *Jacchus argentatus*, Geoff., *Simia argentata*, Linn. It is a very pretty little species, perhaps the prettiest of the genus. [JACCHUS.] The head is small and round, the face and hands of a deep flesh-colour; indeed the face and ears are of so lively a vermillion, that the animal, when in full health, looks almost as if it had been painted with that colour. The body is covered with long silvery-white hair, and the tail is of a shining dark chestnut, sometimes almost black.

MICROCEBUS, M. Geoffroy's name for a form among the *Lemuridæ*: *Lemur* (Galago) *Guineensis*. *Locality.*—The river Amazon; Para.

MICRODACTYLUS. [CARIAMA.]

MICROGLOSSUS. [PSITTACIDÆ.]

MICROMETER, the term generally applied to contrivances for measuring small spaces or angles with great accuracy or convenience.

The word is not applied to some artifices for subdividing the graduations of an astronomical instrument (for these see VERNIER), nor when a magnified portion of a subsidiary arc is used, which may be best considered under the head of SECTOR, ZENITH SECTOR, though they come properly under the definition. We shall follow the usual meaning of the term.

1. *Wire Micrometer.*—When the rays from any bright object fall upon a convex lens, an inverted image of the object is formed, which may be viewed by the eye-piece as if it were a material body. If a fine wire or spider's web be stretched across the telescope tube at the place where the image is formed, this too will be seen distinctly through the eye-piece. Instead of fixing the wire to the telescope tube, it is stretched across a sliding-piece, which is moved by a screw perpendicularly to the length of the telescope, and can thus be made to measure the image in terms of the revolutions and parts of the screw. The head of the screw is divided, and there is an index by which the parts are read off. A little tongue passing over the notches of a plate notes the whole number of revolutions.

An English gentleman named Gascoigne seems first to have applied this principle to practice, but he unfortunately lost his life in the great civil war; and though his telescope fell into Townley's hands, and was used by him, the construction does not seem to have been generally known until it was re-invented by Auzout. Different improvements were gradually made nearly up to the present time. The plate carrying the wire is drawn by the screw, and held back by springs, which prevent any lost time. A micrometer of this kind is now generally applied to circles, transits, and theodolets, in addition to the fixed wires, which of course are always necessary. There are two verifications: first, the ascertaining the value of a révolution of the screw; and secondly, determining the reading of the screw-head when the moveable wire coincides with the fixed wire. In a circle or theodolet the micrometer wire is placed upon a sharp distant object, and the divided limb read off. The screw is turned through several revolutions, and the object is again bisected by moving the whole instrument by its tangent screw, and the divided limb read off a second time. We have then the same angle measured in revolutions of the screw and in the divisions of the instrument, and by a simple proportion have the value of a revolution and of a part. With a transit, the passage of Polaris over the micrometer wire is observed after successive revolutions of the screw. The angular motion of Polaris for the intervals is computed from the polar distance, and thus the value in arc obtained for a revolution of the screw. To determine the zero position of the micrometer wire, the moveable wire is brought to touch the fixed wire, first on one side, and then on the other, and the screw-head read off each time. The mean of the two readings will be that when the two wires are exactly superimposed.

The *position wire micrometer* has lately come very much into use for observations of double stars, and is the wire micrometer proper for equatorials. In this construction there are two wires parallel to each other, each moveable by its own screw: the whole apparatus can also be turned round in the plane of the wires, so as to place the wires in any direction, the angle round which it is turned being read off by two verniers upon a small circle called the position circle. In measuring a double star the wires are brought near each other, and the apparatus turned round until the two stars are either threaded on one of the wires, or, being placed between them, are judged to lie in the same direction. The division of the micrometer circle is then read off, and the observation in position is made. Now, by the divided circle of the micrometer turn the apparatus round 90°, and the wires will be at right angles to the line joining the two stars. By moving the equatorial, place one wire A on one of the stars, and place the other wire B by its screw, on the second star. Read off the screw-head of B, and then place A on the second star by moving the equatorial, and B on the first by moving its screw, and read off the revolutions and parts of B. The difference of the two readings of B will give, in revolutions and parts of the screw, twice the angle between the two stars. The process may be repeated, keeping B fixed and moving A. Before or after a series of observations the zero or index error of the position circle should be ascertained. Place the instrument nearly in the meridian, and make a star run along one of the wires from end to end. Read and note the position circle, which should mark 90° and 270°, and the difference from this is the correction to be applied to all the angles of position observed during the evening. The value of a revolution of the screw may be determined by separating the two wires a given number of revolutions, and observing a series of transits of known stars over them. As large equatorials are always carried by a clock movement, we should recommend fixing the *position micrometer* upon a *slipping*-piece, by which a small motion up or down or to the right or left can be given to the wires without meddling with the clock or the equatorial. With this apparatus the measurement of double stars is perfectly easy. The wire micrometer requires illumination for seeing the wires, and the light thus admitted often obliterates faint and ill-defined objects. For a description of the position micrometer and its application to the measurement of double stars, see De Morgan's *Companion to Maps of the Stars, Appendix*.

The micrometer microscope, for reading off the divisions of graduated circles, depends upon the same principle as the wire micrometer. An enlarged image of the divisions of the limb of the circle is formed, and this image is measured by the revolutions and parts of a screw. [CIRCLE.]

2. The *divided object-glass micrometer* and *heliometer*. If an object-glass be cut across so as to form two semicircles, and the semilenses be separated by sliding one beyond the other, each portion will form its proper image, and these will retreat from each other as the semilenses are moved. The semilenses are mounted on slides, and the quantity of separation read off upon a scale. In Bessel's heliometer, the most magnificent and most perfect instrument of this class, the focal length of the object-glass is eight French feet, and the aperture nearly six French inches. A description and plate will be found in the *Astronomische Nachrichten*, No. 189. The only objection which can be made to this species of micrometer, besides the extreme difficulty of constructing it, is, that stars are not seen so round and well defined as in an entire object-glass. Bessel's measures of double stars are however, so far as we can judge, the most accurate that have yet been made. Suppose a double star is to be measured with the heliometer: the whole of the object end is turned round, until four stars appear in a right line, and the semilenses are separated until the stars appear to be exactly at the same distance from each other, when

the scale is read off. The semilenses are then shifted in a contrary direction, sliding the two images over each other, until they again appear to be at equal distances, and the scale is again read off. The separation of the scale is four times the angular distance between the stars. There is a position circle, on which the direction of the stars is read off. In measuring the diameters of the sun, planets, &c., the two images are made to touch on opposite sides; and in observations of Halley's comet it was made to coincide with the neighbouring stars. The divided object-glass micrometer is on the same principle as the heliometer; a cap containing the divided lenses is placed over the object-glass of the telescope. A similar micrometer may be obtained by dividing one of the lenses of an eye-piece; and it seems probable that, with large telescopes, this micrometer may be of considerable use in measuring small angles. There is a good deal of colour in the images, but not at the point of contact. Micrometers of this class require no illumination.

3. *Reticules* and *circular micrometer*. The micrometers hitherto described are applied to the *accurate* measures of small angles; the present class, though very useful in certain cases, are of much lower pretensions. The reticule, or diaphragm, as it is sometimes called, is any fixed arrangement of wires or bars which can be applied to a telescope for the purpose of measurement. They are chiefly used when an object will not admit of illumination, or where the astronomer has no accurately divided instrument at his disposal, or, as in the case La Caille at the Cape of Good Hope, when the object is to fix approximately a greater number of stars than could be done in the same time with ordinary instruments. Suppose a cross like an X or V to be cut out of brass-plate and inserted in the principal focus of a telescope with the axis of the letter in a meridian. A star in passing through the field is occulted at its passage behind each of the bars, and the time noted. The *interval* will show, by an easy calculation, how far it passes from the vertex; and the *mean* of the times, the moment when it passes the axis of the diaphragm. If the true position of any one star so passing is known from any other source, all the other stars can be thus determined differentially with respect to it. The method is not very accurate, but may often be applied advantageously and with very small instrumental means. If a fine wire be drawn perpendicular to the axis, and a bright star, observed with illumination, made to run along the wire, the axis of the diaphragm can be set in a meridian, and that is the only verification necessary. The computation in declination will be least if the angle between the bars is such that the base of the triangle is equal to its altitude. This reticule is very convenient for mapping, if placed in the meridian, or for cometary observation, if the telescope is mounted as an equatorial, however rudely.

The circular micrometer was introduced, we believe, by Olbers, and perfected by Frauenhofer (*Astron. Nachricht.*, iv. 22), and is much less known and used in this country than it deserves. A metal ring is set in the centre of a perforated glass-plate, and the outer and inner edge of the ring is turned true. The plate is fixed in the focus of a telescope, and the appearance is that of a ring suspended in the heavens. The telescope is pointed, and the observer notes the time when a star disappears at the outer ring, re-appears on the inner ring, disappears again, and finally re-appears. If two stars be thus observed, it is clear that when a mean is taken of the disappearances and re-appearances of each, that the difference between the two means will be the difference of right ascension between the two stars, and therefore that if one be known, the other is determined. Again, if the diameter of the ring has been determined, and the declination of the stars nearly known, the time of describing the chord of the ring will give, by an easy computation, the distance of the chord from the centre, and that the more accurately the smaller the chord described. The sum or difference of these two distances is the difference of the stars in declination. The computation of the second star with its approximate declination may be repeated if the stars are near the pole. It will be seen that nothing is required for the circular micrometer, but the power of fixing the telescope for a few minutes until a known star passes the field, and that no illumination is required. It is especially the apparatus for determining the place of a faint comet or planet, and in the hands of Olbers, Harding, and many other German astronomers, has been of infinite use in cometary astronomy and in the discovery and observation of the small planets. When the comet has a large motion, or when the position of the star is so low as to require attention to the difference of refraction, the computation is a little more complicated, but generally scarcely any computation is required, and the results, in right ascension at least, are good. The observations at the inner edge of the ring are to be preferred. When however the object will bear illumination and the astronomer possesses a telescope so mounted that he can apply a wire micrometer to it, the results from this are incomparably more accurate, and the reticule above mentioned is certainly better for determining declination. Frauenhofer afterwards (*Astronom. Nach.*, iv. 43) proposed another ring and reticule micrometer. He cut a series of rings or lines upon a piece of plane glass which he placed in the principal focus of the object-glass, and then by a side lamp illuminated the rings, leaving the rest of the field dark. It is evident that for certain observations this micrometer would have great advantages.

There are many other micrometers, but they are not in such general use as to demand any notice here. The reader will find them very fully and elaborately described in Pearson's *Astronomy*, vol. ii., p. 126 to 272 inclusive.

MICROPO'GON, M. Temminck's name for a genus of Scansorial Birds which has the general structure of *Bucco*. The gape however is smooth. The three first quills only are graduated. Mr. Swainson arranges it under the '*Bucconinæ*,' or '*Barbuts*,' a subfamily of his *Picidæ*.

MICRO'PTERUS, a name assigned by MM. Quoy and Gaimard to a genus of *Anatidæ*, remarkable for the shortness of their wings.

Two species are recorded, viz. *Micropterus brachypterus* (Quoy and Gaim., *Oidemia Patachonica*, King, *Anas brachyptera*, Lath., *Racehorse* of Cook and Byron, and *Steamer-duck* of King), and *Micropterus Patachonicus*, King, which is smaller in the body than the first, and is able to fly.

Description of the first-named Species.—Above lead-colour, inclining to grey; abdomen whitish; the beauty-spot on the wings white, at the bend a blunt spur; bill yellow, the nail black; legs fuscous yellow. Length from tip of the bill to end of tail, 40 inches; of bill, 3; of wing, from carpal joint to apex of second quill feather, 11; of tail, 5; of tarsi, 2½. (King.)

Habits, Food, &c.—Captain Phillip Parker King, R.N., who has described both species, one in the *Zool. Journal*, and the second in the *Zool. Proceedings*, first fell in with the larger species at Eagle Bay, beyond Cape San Isidro (Point Shut-up of Byron), in the Strait of Magalhaens. 'Here,' writes Captain King, 'we saw, for the first time, that most remarkable bird the Steamer-duck. Before steam-boats were in general use, this bird was denominated, from its swiftness in skimming over the surface of the water, the 'racehorse,' a name which occurs frequently in Cook's, Byron's, and other voyages. It is a gigantic duck, the largest I have met with. It has the lobated hind toe, legs placed far backwards, and other characteristics of the oceanic ducks. The principal peculiarity of this bird is the shortness and remarkably small size of the wings, which, not having sufficient power to raise the body, serve only to propel it along, rather than through the water, and are used like the paddles of a steam-vessel. Aided by these and its strong broad-webbed feet, it moves with astonishing velocity. It would not be an exaggeration to state its speed at from twelve to fifteen miles an hour. The peculiar form of the wing and the short rigid feathers which cover it, together with the power this bird possesses of remaining a considerable time under water, constitute it a striking link between the genera *Anas* and *Aptenodytes*. It has been noticed by many former navigators. The largest we found measured forty inches from the extremity of the bill to that of the tail, and weighed thirteen pounds; but Captain Cook mentions, in his second voyage, that the weight of one was twenty-nine pounds. It is very difficult to kill them, on account of their wariness and thick coat of feathers, which is impenetrable by anything smaller than swan-shot. The flavour of their flesh is so strong and fishy, that at first we killed them solely for specimens. Five or six months however on salt provisions taught many to think such food palatable, and the seamen never lost an opportunity of eating them. I have preferred these ducks to salt beef, but more as a preventive against scurvy than from liking their taste. I am averse to altering names,

particularly in natural history, without very good reason; but in this case I do think the name of "steamer" much more appropriate and descriptive of the swift paddling motion of these birds than that of "race-horse." I believe, too, the name of "steamer" is now generally given to it by those who have visited these regions.'

The same author informs us that *Pecten vitreus*, whose shell is found attached to the leaves of *Fucus giganteus*, together with other *Mollusca*, is the food of the steamer-ducks *M. brachypterus* and *M. Patachonicus*.

(*Narrative of the Surveying Voyages of H. M. S. Adventure and Beagle*, vol. i.)



Race-horse, or Steamer duck (Micropterus brachypterus).

Micropterus comes very near to *Microptera*, Gravenhorst's name for a genus of coleopterous insects, and to *Microptère* of Lacépède, who uses the term to designate a genus of Acanthopterygious fishes.

MI'CROPUS, Mr. Swainson's name for the first genus of his Brachypodinæ, the first subfamily of the *Merulidæ*, according to his arrangement. [MERULIDÆ.]

Example, *Micropus chalcocephalus; Ixos chalcocephalus*, Temm.

Description.—Male.—The whole head covered with a sort of hood of metallic black with violet reflections; the neck, the shoulders, the back, and wings dull gray or lead colour; breast deep gray, which becomes brighter on the other lower parts of the body; wings black, but the secondaries gray, bordered with whitish on the exterior barbs; tail gray, with a transverse black band, and terminated with a broad white border. Length six inches four lines. *Female:* less lively in colour.

Locality, Java, where Van Hasselt found it in the wild and woody district of Bantam.



Micropus chalcocephalus (male).

MICROSCOPE, the name of an instrument for enabling the eye to see distinctly objects which are placed at a very short distance from it, or to see magnified images of small objects, and therefore to see smaller objects than would otherwise be visible. The name is derived from the two Greek words, expressing this property, *μικρός, small*, and *σκοπέω, to see.*

So little is known of the early history of the microscope, and so certain is it that the magnifying power of lenses must have been discovered as soon as lenses were made, that there is no reason for hazarding any doubtful speculations on the question of discovery. We shall proceed therefore at once to describe the simplest forms of microscopes, to explain their later and more important improvements, and finally to exhibit the instrument in its present perfect state.

In doing this we shall assume that the reader is familiar with the information contained in the articles LIGHT, LENS, ACHROMATIC, ABERRATION, and the other subdivisions of the science of Optics which are treated of in this work.

The use of the term *magnifying* has led many into a misconception of the nature of the effect produced by convex lenses. It is not always understood that the so-called magnifying power of a lens applied to the eye, as in a microscope, is derived from its enabling the eye to approach more nearly to its object than would otherwise be compatible with distinct vision. The common occurrence of walking across the street to read a bill is in fact magnifying the bill by approach; and the observer, at every step he takes, makes a change in the optical arrangement of his eye, to adapt it to the lessening distance between himself and the object of his inquiry. This power of spontaneous adjustment is so unconsciously excited, that unless the attention be called to it by circumstances, we are totally unaware of its exercise.

In the case just mentioned the bill would be read with eyes in a very different state of adjustment from that in which it was discovered on the opposite side of the street, but no conviction of this fact would be impressed upon the mind. If however the supposed individual should perceive on some part of the paper a small speck, which he suspects to be a minute insect, and if he should attempt a very close approach of his eye for the purpose of verifying his suspicion, he would presently find that the power of natural adjustment has a limit; for when his eye has arrived within about ten inches, he will discover that a further approach produces only confusion. But if, as he continues to approach, he were to place before his eye a series of properly arranged convex lenses he would see the object gradually and distinctly increase in apparent size by the mere continuance of the operation of approaching. Yet the glasses applied to the eye during the approach from ten inches to one inch, would have done nothing more than had been previously done by the eye itself during the approach from fifty feet to one foot. In both cases the magnifying is effected really by the approach, the lenses merely rendering the latter periods of the approach compatible with distinct vision.

A very striking proof of this statement may be obtained by the following simple and instructive experiment. Take any minute object, a very small insect for instance, held on a pin or gummed to a slip of glass; then present it to a strong light, and look at it through the finest needle-hole in a blackened card placed about an inch before it. The insect will appear quite distinct, and about ten times larger than its usual size. Then suddenly withdraw the card without disturbing the object, which will instantly become indistinct and nearly invisible. The reason is, that the naked eye cannot see at so small a distance as one inch. But the card with the hole having enabled the eye to approach within an inch, and to see distinctly at that distance, is thus proved to be as decidedly a magnifying instrument as any lens or combination of lenses.

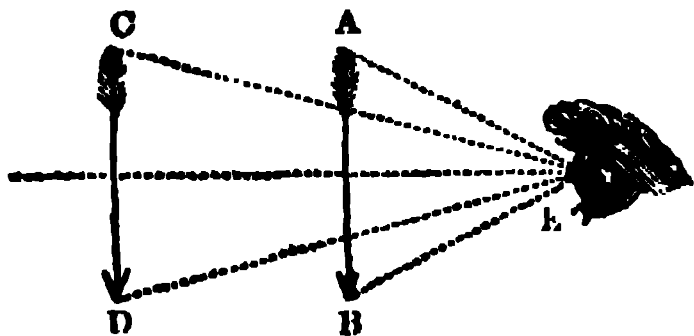
This description of magnifying power does not apply to such instruments as the solar or gas microscope, by which we look not at the object itself, but at its shadow or picture on the wall; and the description will require some modification in treating of the compound microscope, where, as in the telescope, an image or picture is formed by one lens, that image or picture being viewed as an original object by another lens.

It is nevertheless so important to obtain a clear notion of the real nature of the effect produced by a lens applied to the eye, that we will adduce the instance of spectacles to render the point more familiar. If the person who has

been supposed to cross the street for the purpose of reading a bill had been aged, the limit to the power of adjustment would have been discovered at a greater distance, and without so severe a test as the supposed insect. The eyes of the very aged generally lose the power of adjustment at a distance of thirty or forty inches instead of ten, and the spectacles worn in consequence are as much magnifying glasses to them as the lenses employed by younger eyes to examine the most minute objects. Spectacles are magnifying glasses to the aged because they enable such persons to see as closely to their objects as the young, and therefore to see the objects larger than they could themselves otherwise see them, but not larger than they are seen by the unassisted younger eye.

In saying that an object appears larger at one time, or to one person, than another, it is necessary to guard against misconception. By the apparent size of an object we mean the angle it subtends at the eye, or the angle formed by two lines drawn from the centre of the eye to the extremities of the object. In *figure* 1, the lines A E and B E drawn

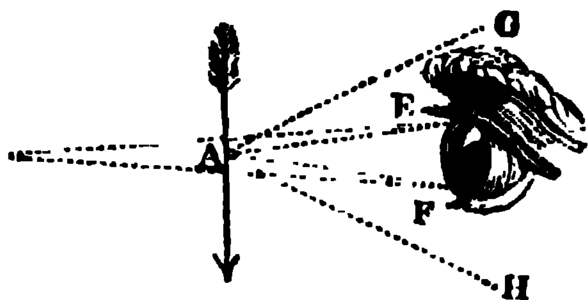
Fig. 1.



from the arrow to the eye form the angle A E B, which, when the angle is small, is nearly twice as great as the angle C E D formed by lines drawn from a similar arrow at twice the distance. The arrow A B will therefore appear nearly twice as long as C D, being seen under twice the angle, and in the same proportion for any greater or lesser difference in distance. The angle in question is called the angle of vision, or the visual angle.

The angle of vision must however not be confounded with the angle of the pencil of light by which an object is seen, and which is explained in *figure* 2. Here we have

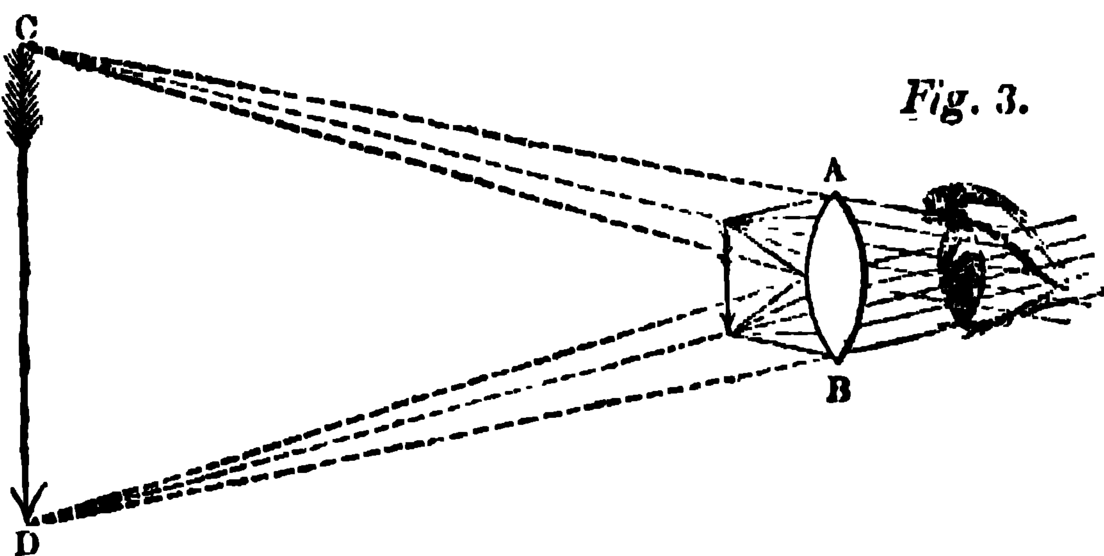
Fig. 2.



drawn two arrows placed in relation to the eye as before, and from the centre of each have drawn lines exhibiting the quantity of light which each point will send into the eye at the respective distances.

Now if E F represent the diameter of the pupil, the angle E A F shows the size of the cone or pencil of light which enters the eye from the point A, and in like manner the angle E B F is that of the pencil emanating from B, and entering the eye. Then, since E A F is double E B F, it is evident that A is seen by four times the quantity of light which could be received from an equally illuminated point at B; so that the nearer body would appear brighter if it did not appear larger; but as its apparent area is increased four times, as well as its light, no difference in this respect is discovered. But if we could find means to send into the eye a larger pencil of light, as for instance that shown by the lines G A H, without increasing the apparent size in the same proportion, it is evident that we should obtain a benefit totally distinct from that of increased magnitude, and one which is in some cases of even more importance than size in developing the structure of what we wish to examine. This, it will be hereafter shown, is sometimes done; for the present, we wish merely to explain clearly the distinction between apparent magnitude, or the angle under which the object is seen, and apparent brightness, or the angle of the pencil of light by which each of its points is seen, and with these explanations we shall continue to employ the common expressions magnifying glass and magnifying power.

The magnifying power of a single lens depends upon its focal length, the object being in fact placed nearly in its principal focus, or so that the light which diverges from each point may, after refraction by the lens, proceed in parallel lines to the eye, or as nearly so as is requisite for distinct vision. In *fig.* 3, A B is a double convex lens, near



which is a small arrow to represent the object under examination, and the cones drawn from its extremities are portions of the rays of light diverging from those points and falling upon the lens. These rays, if suffered to fall at once upon the pupil, would be too divergent to permit their being brought to a focus upon the retina by the optical arrangements of the eye. But being first passed through the lens, they are bent into nearly parallel lines, or into lines diverging from some points within the limits of distinct vision, as from C and D. Thus altered, the eye receives them precisely as if they emanated from a larger arrow placed at C D, which we may suppose to be ten inches from the eye, and then the difference between the real and the imaginary arrow is called the magnifying power of the lens in question.

From what has been said it will be evident that two persons whose eyes differed as to the distance at which they obtained distinct vision, would give different results as to the magnifying power of a lens. To one who can see distinctly with the naked eye at a distance of five inches, the magnifying power would seem and would indeed be only half what we have assumed. Such instances are however rare; the focal length of the eye usually ranges from six to twelve or fourteen inches, so that the distance we first assumed of ten inches is very near the true average, and is a convenient number, inasmuch as a cipher added to the denominator of the fraction which expresses the focal length of a lens gives its magnifying power. Thus a lens whose focal length is one-sixteenth of an inch is said to magnify 160 times.

When the focal length of a lens is very small it is difficult to measure accurately the distance between its centre and its object. In such cases the best way to obtain the focal length for parallel or nearly parallel rays is to view the image of some distant object formed by the lens in question through another lens of one inch solar focal length, keeping both eyes open and comparing the image presented through the two lenses with that of the naked eye. The proportion between the two images so seen will be the focal length required. Thus if the image seen by the naked eye is ten times as large as that shown by the lenses, the focal length of the lens in question is one-tenth of an inch. The panes of glass in a window, or courses of bricks in a wall, are convenient objects for this purpose.

In whichever way the focal length of the lens is ascertained, the rules given for deducing its magnifying power are not rigorously correct, though they are sufficiently so for all practical purposes, particularly as the whole rests on an assumption in regard to the focal length of the eye, and as it does not in any way affect the actual measurement of the object. To calculate with great precision the magnifying power of a lens with a given focal length of eye, it is necessary that the thickness of the lens be taken into the account, and also the focal length of the eye itself.

We have hitherto considered a magnifying lens only in reference to its enlargement of the object, or the increase of the angle under which the object is seen. A further and equally important consideration is that of the number of rays or quantity of light by which every point of the object is rendered visible. The naked eye, as shown in *fig.* 2, admits from each point of every visible object a cone of light having the diameter of the pupil for its base, and most persons are familiar with that beautiful provision by which in cases of excessive brilliancy the pupil spontaneously contracts to reduce the cone of admitted light within bearable limits. This effect is still further produced in the experiment already described, of looking at an object through a

needle-hole in a card, which is equivalent to reducing the pupil to the size of a needle-hole. Seen in this way the object becomes comparatively dark or obscure; because each point is seen by means of a very small cone of light, and a little consideration will suffice to explain the different effects produced by the needle-hole and the lens. Both change the angular value of the cone of light presented to the eye, but the lens changes the angle by bending the extreme rays within the limits suited to distinct vision, while the needle-hole effects the same purpose by cutting off the rays which exceed those limits.

It has been shown that removing a brilliant object to a greater distance will reduce the quantity of light which each point sends into the eye, as effectually as viewing it through a needle-hole; and magnifying an object by a lens has been shown to be the same thing in some respects as removing it to a greater distance. We have to see the magnified picture by the light emanating from the small object, and it becomes a matter of difficulty to obtain from each point a sufficient quantity of light to bear the diffusion of a great magnifying power. We want to perform an operation just the reverse of applying the card with the needle-hole to the eye—we want in some cases to bring into the eye the largest possible pencil of light from each point of the object.

Referring to *fig.* 3, it will be observed that if the eye could see the small arrow at the distance there shown without the intervention of the lens, only a very small portion of the cones of light drawn from its extremities would enter the pupil; whereas we have supposed that after being bent by the lens the whole of this light enters the eye as part of the cones of smaller angle whose summits are at C and D. These cones will further explain the difference between large and small pencils of light; those from the small arrow are large pencils; the dotted cones from the large arrow are small pencils.

In assuming that the whole of this light could have been suffered to enter the eye through the lens A B, we did so for the sake of not perplexing the reader with too many considerations at once. He must now learn that so large a pencil of light passing through a single lens would be so distorted by the spherical figure of the lens, and by the chromatic dispersion of the glass, as to produce a very confused and imperfect image. This confusion may be greatly diminished by reducing the pencil; for instance, by applying a stop, as it is called, to the lens, which is neither more nor less than the needle-hole applied to the eye. A small pencil of light may be thus transmitted through a single lens without suffering from spherical aberration or chromatic dispersion any amount of distortion which will materially affect the figure of the object; but this quantity of light is insufficient to bear diffusion over the magnified picture, which is therefore too obscure to exhibit what we most desire to see,—those beautiful and delicate markings by which one kind of organic matter is distinguished from another. With a small aperture these markings are not seen at all; with a large aperture and a single lens they exhibit a faint nebulous appearance enveloped in a chromatic mist, a state which is of course utterly valueless to the naturalist, and not even amusing to the amateur.

It becomes therefore a most important problem to reconcile a large aperture with distinctness, or, as it is called, *definition*; and this has been done in a considerable degree by effecting the required amount of refraction through two or more lenses instead of one, thus reducing the angles of incidence and refraction, and producing other effects which will be shortly noticed. This was first accomplished in a satisfactory manner by—

Dr. Wollaston's Doublet,

Fig. 4. invented by the celebrated philosopher whose name it bears; it consists of two plano-convex lenses (*fig.* 4) having their focal lengths in the proportion of 1 to 3, or nearly so, and placed at a distance which can be ascertained best by actual experiment. Their plane sides are placed towards the object, and the lens of shortest focal length next the object.

It appears that Dr. Wollaston was led to this invention by considering that the Achromatic Huyghenean Eye-piece, which will be hereafter described, would, if reversed, possess similar good properties as a simple microscope. But it will be evident when the eye-piece is understood, that the circumstances which render it achromatic are very imperfectly applicable to the simple microscope, and that the doublet, without a nice adjustment of the stop, would be valueless. Dr. Wollaston makes no allusion to a stop, nor is it certain that he contemplated its introduction, although his illness, which terminated fatally soon after the presentation of his paper, may account for the omission.

The nature of the corrections which take place in the doublet is explained in the annexed diagram (*fig.* 5), where L O L′ is the object, P a portion of the pupil, and D D the stop, or limiting aperture.

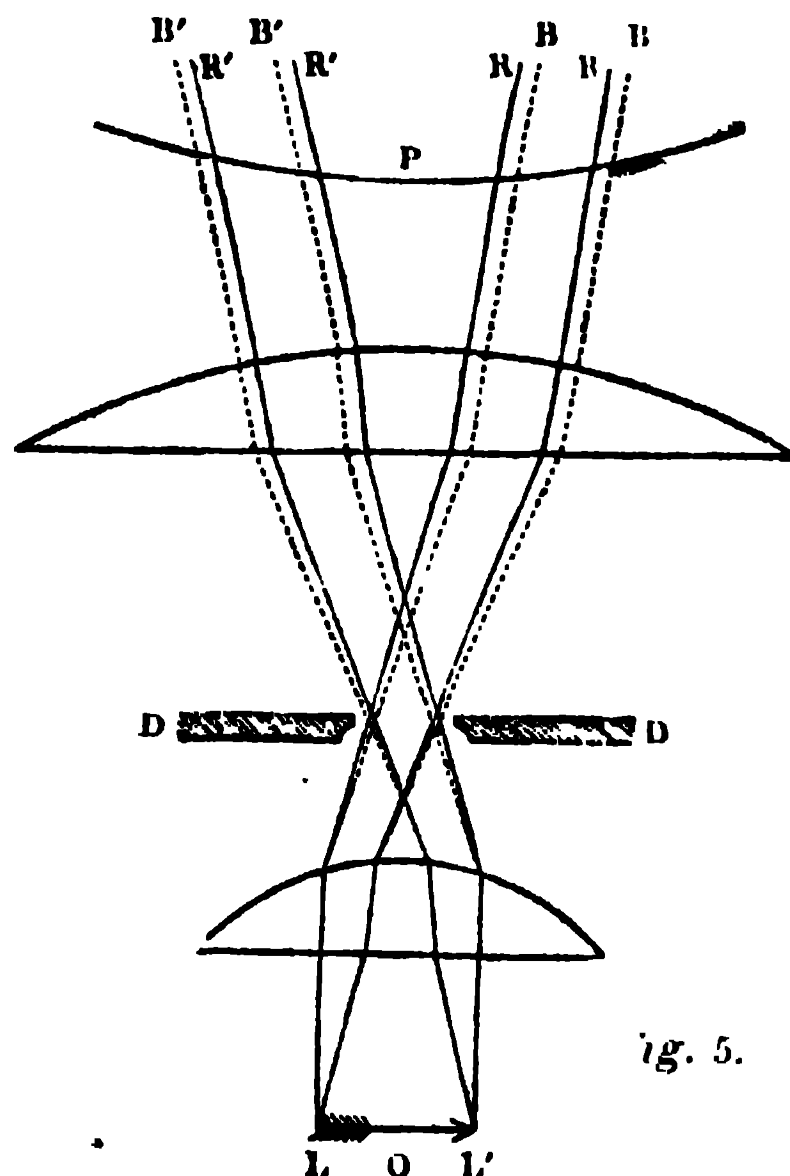


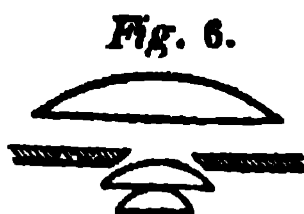
Fig. 5.

Now, it will be observed that each of the pencils of light from the extremities L L′ of the object is rendered excentrical by the stop, and of consequence each passes through the two lenses on opposite sides of their common axis O P; thus each becomes affected by opposite errors, which to some extent balance and correct each other. To take the pencil L, for instance, which enters the eye at R B R B, it is bent to the right at the first lens, and to the left at the second; and as each bending alters the direction of the blue rays more than the red, and moreover as the blue rays fall nearer the margin of the second lens, where the refraction, being more powerful than near the centre, compensates in some degree for the greater focal length of the second lens, the blue and red rays will emerge very nearly parallel, and of consequence colourless to the eye. At the same time the spherical aberration has been diminished by the circumstance that the side of the pencil which passes one lens nearest the axis passes the other nearest the margin.

This explanation applies only to the pencils near the extremities of the object. The central pencil, it is obvious, would pass both lenses symmetrically; the same portions of light occupying nearly the same relative places on both lenses. The blue light would enter the second lens nearer to its axis than the red, and being thus less refracted than the red by the second lens, a small amount of compensation would take place, quite different in principle and inferior in degree to that which is produced in the excentrical pencils. In the intermediate spaces the corrections are still more imperfect and uncertain; and this explains the cause of the aberrations which must of necessity exist even in the best-made doublet. It is however infinitely superior to a single lens, and will transmit a pencil of an angle of from 35° to 50° without any very sensible errors. It exhibits therefore many of the usual test-objects in a very beautiful manner.

The next step in the improvement of the simple microscope bears more analogy to the eye-piece. This improvement was made by Mr. Holland, and it consists (as shown in *fig.* 6) in substituting two lenses for the first in the doublet, and retaining the stop between them and the third. The first bending, being thus effected by two lenses instead of one, is accompanied by smaller aberrations, which are therefore more completely balanced or corrected at the second bend-

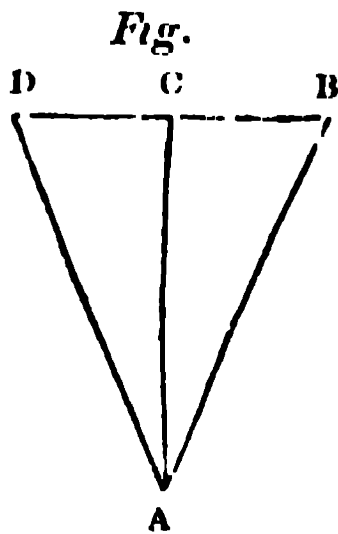
Fig. 6.



ing, in the opposite direction, by the third lens. This combination, though called a triplet, is essentially a doublet, in which the anterior lens is divided into two. For it must be recollected that the first pair of lenses merely accomplishes what might have been done, though with less precision, by one; but the two lenses of the doublet are opposed to each other; the second diminishing the magnifying power of the first. The first pair of lenses in the triplet concur in producing a certain amount of magnifying power, which is diminished in quantity and corrected as to aberration at the third lens by the change in relation to the position of the axis which takes place in the pencil between what is virtually the first and second lens. In this combination the errors are still further reduced by the close approximation to the object which causes the refractions to take place near the axis. Thus the transmission of a still larger angular pencil, namely 65°, is rendered compatible with distinctness, and a more intense image is presented to the eye.

Every increase in the number of lenses is attended with one drawback, from the circumstance that a certain portion of light is lost by reflection and absorption each time that the ray enters a new medium. This loss bears no sensible proportion to the gain arising from the increased aperture, which, being as the square of the diameter, multiplies rapidly; or if we estimate by the angle of the admitted pencil, which is more easily ascertained, the intensity will be as the square of twice the tangent of half the angle. To explain this, let D B (*fig.* 7) represent the diameter of the lens, or of that part of it which is really employed; C A the perpendicular drawn from its centre, and A B, A D, the extreme rays of the incident pencil of light D A B. Then the diameter being 2 C B, the area to which the intensity of vision is proportional will be $(2\,CB)^2$, and C B is evidently the tangent of the angle C A B, which is half the angle of the admitted pencil D A B. Or, if a be used to denote the angular aperture, the expression for the intensity is $(2\tan.\frac{1}{2}a)^2$, which increases so rapidly with the increase of a, as to make the loss of light by reflection and absorption of little consequence.

Fig.

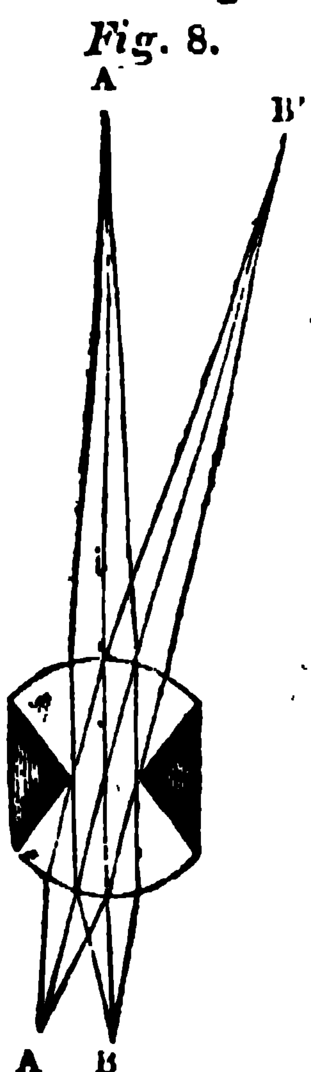


The combination of three lenses approaches, as has been stated, very close to the object; so close, indeed, as to prevent the use of more than three; and this constitutes a limit to the improvement of the simple microscope, for it is called a simple microscope, although consisting of three lenses, and although a compound microscope may be made of only three or even two lenses; but the different arrangement which gives rise to the term compound will be better understood when that instrument is explained.

Before we proceed to describe the simple microscope and its appendages, it will be well to explain such other points in reference to the form and materials of lenses as are most likely to be interesting.

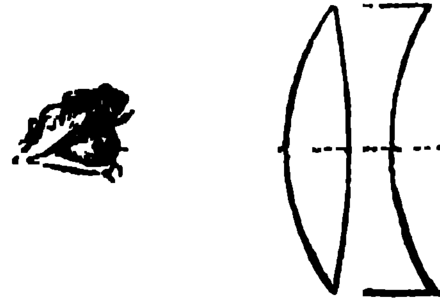
A very useful form of lens was proposed by Dr. Wollaston, and called by him the Periscopic lens. It consisted of two hemispherical lenses, cemented together by their plane faces, having a stop between them to limit the aperture. A similar proposal was made by Mr. Coddington, who however executed the project in a better manner, by cutting a groove in a whole sphere, and filling the groove with opaque matter. His lens, which is the well-known Coddington lens, is shown in *fig.* 8. It gives a large field of view, which is equally good in all directions, as it is evident that the pencils A A′ and B B′ pass through under precisely the same circumstances. Its spherical form has the further advantage of rendering the position in which it is held of comparatively little consequence. It is therefore very convenient as a hand-lens, but its definition is of course not so good as that of a well-made doublet or achromatic lens.

Fig. 8.



Another very useful form of doublet was proposed by Sir John Herschel, chiefly like the Coddington lens, for the sake of a wide field, and chiefly to be used in the hand. It is shown in *fig.* 9: it consists of a double convex or crossed lens, having the radii of curvature as 1 to 6, and of a plane concave lens whose focal length is to that of the convex lens as 13 to 5.

Fig. 9.



Various, indeed innumerable, other forms and combinations of lenses have been projected, some displaying much ingenuity, but few of any practical use. In the Catadioptric lenses the light emerges at right angles from its entering direction, being reflected from a surface cut at an angle of 45 degrees to the axes of the curved surfaces.

It was at one time hoped, as the precious stones are more refractive than glass, and as the increased refractive power is unaccompanied by a correspondent increase in chromatic dispersion, that they would furnish valuable materials for lenses, inasmuch as the refractions would be accomplished by shallower curves, and consequently with diminished spherical aberration. But these hopes were disappointed: everything that ingenuity and perseverance could accomplish was tried by Mr. Varley and Mr. Pritchard, under the patronage of Dr. Goring. It appeared however that the great reflective power, the doubly-refracting property, the colour, and the heterogeneous structure of the jewels which were tried, much more than counterbalanced the benefits arising from their greater refractive power, and left no doubt of the superiority of skilfully made glass doublets and triplets. The idea is now, in fact, abandoned; and the same remark is applicable to the attempts at constructing fluid lenses, and to the projects for giving to glass other than spherical surfaces,—none of which have come into extensive use.

By the term *simple* microscope is meant one in which the object is viewed directly through a lens or combination of lenses, just as we have supposed an arrow or an insect to be viewed through a glass held in the hand. When however the magnifying power of the glass is considerable, in other words, when its focal length is very short, and its proper distance from its object of consequence equally short, it requires to be placed at that proper distance with great precision: it cannot therefore be held with sufficient accuracy and steadiness by the unassisted hand, but must be mounted in a frame having a rack or screw to move it towards or from another frame or stage which holds the object. It is then called a microscope, and it is furnished, according to circumstances, with lenses and mirrors to collect and reflect the light upon the object, and with other conveniences which will now be described.

One of the best forms of a stand for a simple microscope is shown in *fig.* 10, where A is a brass pillar screwed to a tripod base; B is a broad stage for the objects, secured to

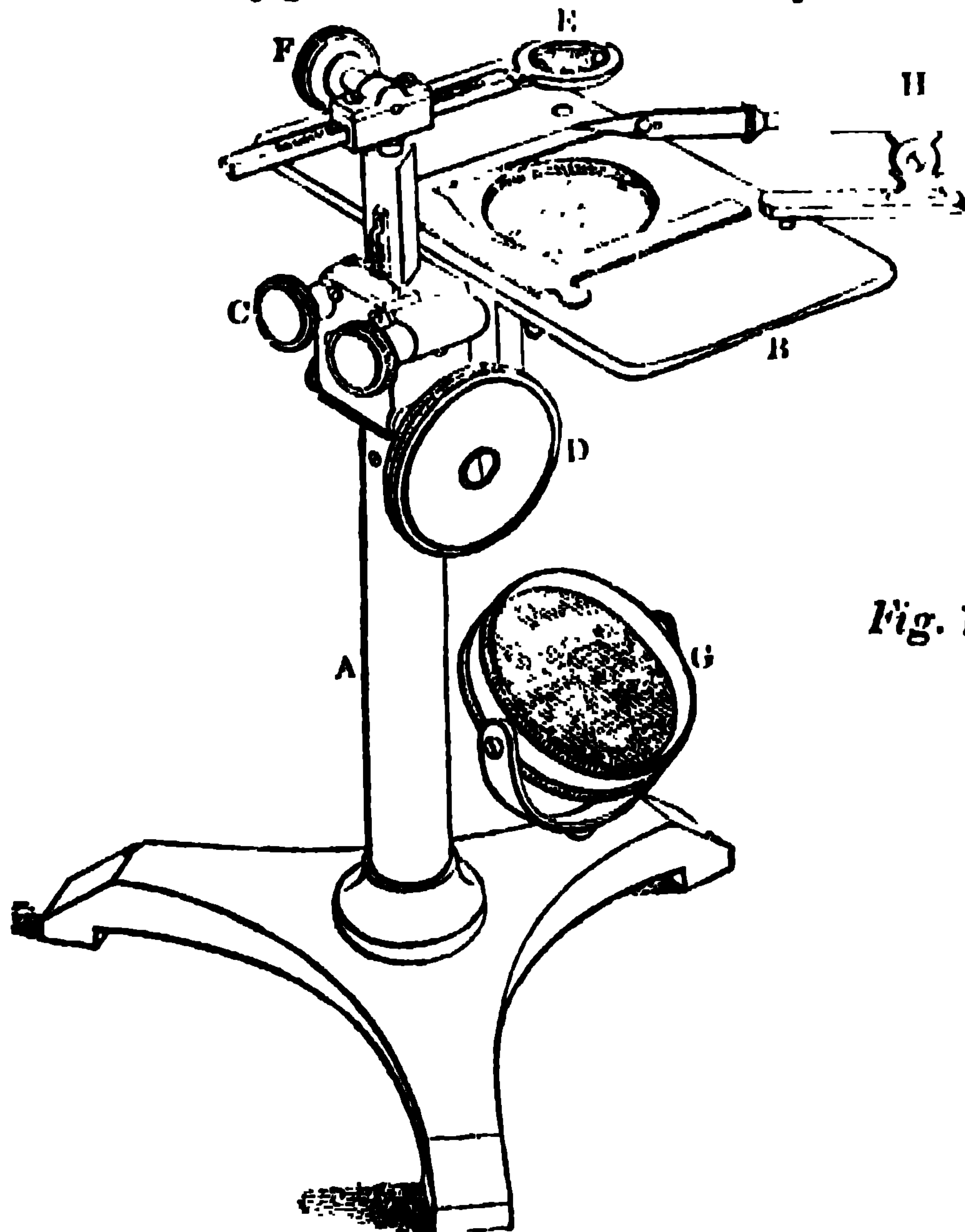


Fig. 10.

the stem by screws, whose milled heads are at C. By means of the large milled head D, a triangular bar, having a rack, is elevated out of the stem A, carrying the lens-holder E, which has a horizontal movement in one direction, by means of a rack worked by the milled head F, and in the other direction by turning on a circular pin. A concave mirror G reflects the light upwards through the hole in the stage, and a lens may be attached to the stage for the purpose of throwing light on an opaque object, in the same way that the forceps H for holding such objects is attached. This microscope is peculiarly adapted, by its broad stage and its general steadiness, for dissecting; and it is rendered more convenient for this purpose by placing it between two inclined planes of mahogany, which support the arms and elevate the wrists to the level of the stage. This apparatus is called the dissecting rest. When dissecting is not a primary object, a joint may be made at the lower end of the stem A, to allow the whole to take an inclined position; and then the spring clips shown upon the stage are useful to retain the object in its place. Numerous convenient appendages may be made to accompany such microscopes, which it will be impossible to mention in detail: the most useful are Mr. Varley's capillary cages for containing animalculæ in water, and parts of aquatic plants; also his tubes for obtaining and separating such objects, and his phial and phial-holder for preserving and exhibiting small living specimens of the Chara, Nitella, and other similar plants, and observing their circulation. The phial-microscope affords facilities for observing the operations of minute vegetable and animal life, which will probably lead to the most interesting discoveries. The recent volumes of the Transactions of the Society of Arts contain an immense mass of information of this sort, and to these we refer the reader.

The mode of illuminating objects is one on which we must give some further information, for the manner in which an object is lighted is second in importance only to the excellence of the glass through which it is seen. In investigating any new or unknown specimen, it should be viewed in turns by every description of light, direct and oblique, as a transparent object and as an opaque object, with strong and with faint light, with large angular pencils and with small angular pencils thrown in all possible directions. Every change will probably develop some new fact in reference to the structure of the object, which should itself be varied in the mode of mounting in every possible way. It should be seen both wet and dry, and immersed in fluids of various qualities and densities, such as water, alcohol, oil, and Canada balsam, for instance, which last has a refractive power nearly equal to that of glass. If the object be delicate vegetable tissue, it will be in some respects rendered more visible by gentle heating or scorching by a clear fire placed between two plates of glass. In this way the spiral vessels of asparagus and other similar vegetables may be beautifully displayed. Dyeing the objects in tincture of iodine will in some cases answer this purpose better.

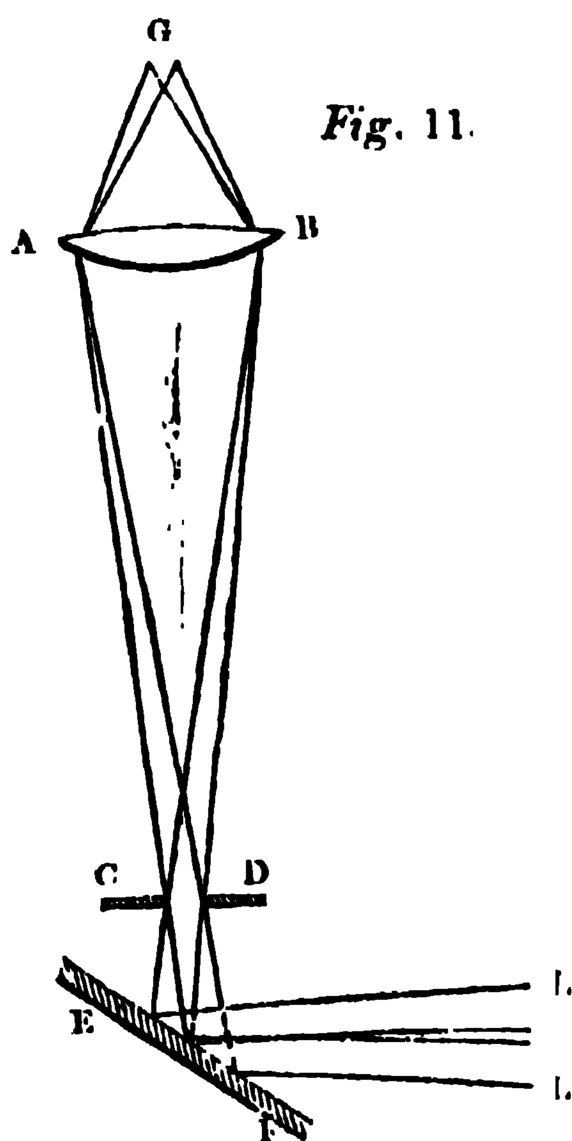


Fig. 11.

But the principal question in regard to illumination is the magnitude of the illuminating pencil, particularly in reference to transparent objects. Generally speaking the illuminating pencil should be as large as can be received by the lens, and no larger. Any light beyond this produces indistinctness and glare. The superfluous light from the mirror may be cut off by a screen having various-sized apertures placed below the stage; but the best mode of illumination is that proposed by Dr. Wollaston, and called the Wollaston condenser. A tube is placed below the stage of the instrument containing a lens A B (*fig.* 11), which can be elevated or depressed within certain limits at pleasure; and at the lower end is a stop with a limited aperture C D. A plane mirror E F receives the rays of light L L from the sky or a white cloud, which last is the best source of light, and reflects them upwards through the aperture in C D, so that they are refracted, and form an image of the aperture at G, which is supposed to be nearly the place of the object. The object is sometimes best seen when the image of the aperture is also best seen; and sometimes it is best to elevate the summit G of the cone A B G above the object, and at others to depress it below: all which is done at pleasure by the power of moving the lens A B. If artificial light (as a lamp or candle) be employed, the flame must be placed in the principal focus of a large detached lens on a stand, so that the rays L L may fall in parallel lines on the mirror, or as they would fall from the cloud. This will be found an advantage, not only when the Wollaston condenser is employed, but also when the mirror and diaphragm are used. A good mode of imitating artificially the light of a white cloud opposite the sun has been proposed by Mr. Varley: he covers the surface of the mirror under the stage with carbonate of soda or any similar material, and then concentrates the sun's light upon its surface by a large condensing lens. The intense white light diffused from the surface of the soda forms an excellent substitute for the white cloud, which, when opposite the sun and of considerable size, is the best day-light, as the pure sky opposite to the sun is the worst.

The Compound Microscope may, as before stated, consist of only two lenses, while a simple microscope has been shown to contain sometimes three. In the triplet for the simple microscope however it was explained that the effect of the two first lenses was to do what might have been accomplished, though not so well, by one; and the third merely effected certain modifications in the light before it entered the eye. But in the compound microscope the two lenses have totally different functions; the first receives the rays from the object, and, bringing them to new foci, forms an image, which the second lens treats as an original object, and magnifies it just as the single microscope magnified the object itself.

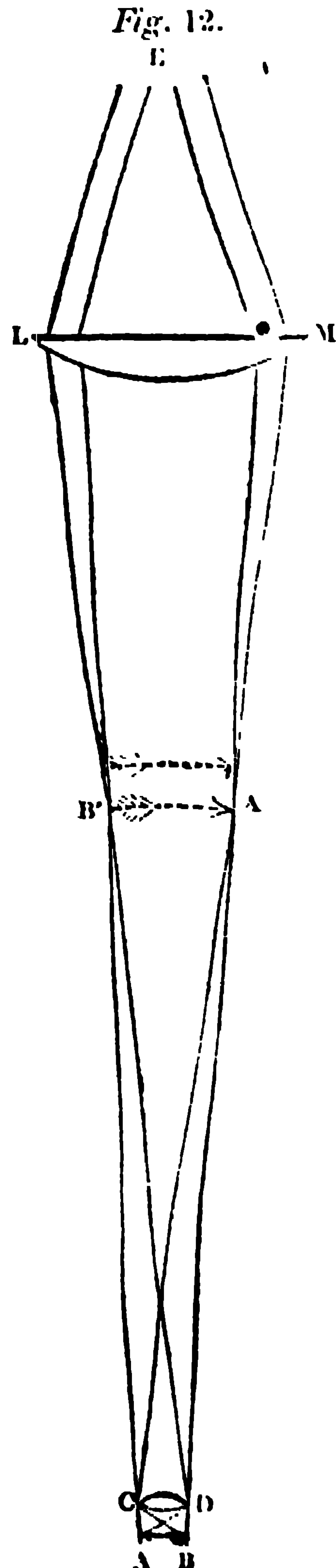


Fig. 12.

The annexed figure (12) shows the course of the rays through a compound microscope of two lenses. The rays proceeding from the object A B are so acted upon by the lens C D, near it, and thence called the object-glass, that they are converged to foci in A′ B′, where they form an enlarged image of the object, as would be evident if a piece of oiled paper or ground glass were placed there to receive them. They are not so intercepted, and therefore the image is not rendered visible at that place; but their further progress is similar to what it would have been had they really proceeded from an object at A′ B′. They are at length received by the eye-lens L M, which acts upon them as the simple microscope has been described to act on the light proceeding from its objects. They are bent so that they may enter the eye at E in parallel lines, or as nearly so as is requisite for distinct vision. When we say that the rays enter the eye in nearly parallel lines, we mean only those which proceed from one point of the original object. Thus the two parallel rays M E have proceeded from and are part of the cone of rays C A D, emanating from the point A of the arrow; but they do not form two pictures in the eye, because any number of parallel rays which the pupil can receive will be converged to a point by the eye, and will convey the impression of one point to the mind. In like manner the rays L E are part of the cone of rays emanating from B, and the angle L E M is that under which the eye will see the magnified image of the arrow, which is evidently many times greater than the arrow could be made to occupy in the naked eye

at any distance within the limits of distinct vision. The magnifying power depends on two circumstances: first, on the ratio between the anterior distance A C or B D and the posterior focal length C B′ or D A′; and secondly, on the power of the eye-lens L M. The first ratio is the same as that between the object A B and the image A′ B′; this and the focal length or power of the eye-lens are both easily obtained, and their product is the power of the compound instrument.

Since the power depends on the ratio between the anterior and posterior foci of the object-glass, it is evident that by increasing that ratio any power may be obtained, the same eye-glass being used; or having determined the first, any further power may be obtained by increasing that of the eye-glass; and thus, by a pre-arrangement of the relative proportions in which the magnifying power shall be divided between the object-glass and the eye glass, almost any given distance (within certain limits) between the first and its object may be secured. This is one valuable peculiarity of the compound instrument; and another is the large field, or large angle of view, which may be obtained, every part of which will be nearly equally good; whereas with the best simple microscopes the field is small, and is good only in the centre. The field of the compound instrument is further increased by using two glasses at the eye-end; the first being called, from its purpose, the field-glass, and the two constituting what is called the eye-piece. This will be more particularly explained in the figure of the achromatic compound microscope presently given.

For upwards of a century the compound microscope, notwithstanding the advantages above mentioned, was a comparatively feeble and inefficient instrument, owing to the distance which the light had to traverse, and the consequent increase of the chromatic and spherical aberrations. To explain this we have drawn in *fig.* 12 a second image near A′ B′, the fact being that the object-glass would not form one image, as has been supposed, but an infinite number of variously-coloured and various-sized images, occupying the space between the two dotted arrows. Those nearest the object-glass would be red, and those nearest the eye-glass would be blue. The effect of this is to produce so much confusion, that the instrument was reduced to a mere toy, although these errors were diminished to the utmost possible extent by limiting the aperture of the object-glass, and thus restricting the angle of the pencil of light from each point of the object. But this involved the defects, already explained, of making the picture obscure, so that on the whole the best compound instruments were inferior to the simple microscopes of a single lens, with which indeed all the important observations of the last century were made.

Even after the improvement of the simple microscope by the use of doublets and triplets, the long course of the rays and the large angular pencil required in the compound instrument deterred the most sanguine from anticipating the period when they should be conducted through such a path free both from spherical and chromatic errors. Within twenty years of the present period, philosophers of no less eminence than M. Biot and Dr. Wollaston predicted that the compound would never rival the simple microscope, and that the idea of achromatising its object-glass was hopeless. Nor can these opinions be wondered at when we consider how many years the achromatic telescope had existed without an attempt to apply its principles to the compound microscope. When we consider the smallness of the pencil required by the telescope, and the enormous increase of difficulty attending every enlargement of the pencil—when we consider further that these difficulties had to be contended with and removed by operations on portions of glass so small that they are themselves almost microscopic objects, we shall not be surprised that even a cautious philosopher and most able manipulator like Dr. Wollaston should prescribe limits to improvement.

Fortunately for science, and especially for the departments of animal and vegetable physiology, these predictions have been shown to be unfounded. The last fifteen years have sufficed to elevate the compound microscope from the condition we have described to that of being the most important instrument ever bestowed by art upon the investigator of nature. It now holds a very high rank among philosophical implements, while the transcendent beauties of form, colour, and organization which it reveals to us in the minute works of nature, render it subservient to the most delightful and instructive pursuits. To these claims on our attention it appears likely to add a third of still higher importance. The microscopic examination of the blood and other human organic matter will in all probability afford more satisfactory and conclusive evidence regarding the nature and seat of disease than any hitherto appealed to, and will of consequence lead to similar certainty in the choice and application of remedies.

We have thought it necessary to state thus at large the claims of the modern achromatic microscope upon the attention of the reader, as a justification of the length at which we shall give its recent history and explain its construction; and we are further induced to this course by the consideration that the subject is entirely new ground, and that there are at this time not more than two or three makers of achromatic microscopes in England.

Soon after the year 1820 a series of experiments was begun in France by M. Selligues, which were followed up by Frauenhofer at Münich, by Amici at Modena, by M. Chevalier at Paris, and by the late Mr. Tulley in London. In 1824 the last-named excellent artist, without knowing what had been done on the Continent, made the attempt to construct an achromatic object-glass for a compound microscope, and produced one of nine-tenths of an inch focal length, composed of three lenses, and transmitting a pencil of eighteen degrees. This was the first that had been made in England; and it is due to Mr. Tulley to say, that as regards accurate correction throughout the field, that glass has not been excelled by any subsequent combination of three lenses. Such an angular pencil, and such a focal length, would bear an eye-piece adapted to produce a gross magnifying power of one hundred and twenty. Mr. Tulley afterwards made a combination to be placed in front of the first mentioned, which increased the angle of the transmitted pencil to thirty-eight degrees, and bore a power of three hundred.

While these practical investigations were in progress, the subject of achromatism engaged the attention of some of the most profound mathematicians in England. Sir John Herschel, Professor Airy, Professor Barlow, Mr. Coddington, and others, contributed largely to the theoretical examination of the subject; and though the results of their labours were not immediately applicable to the microscope, they essentially promoted its improvement.

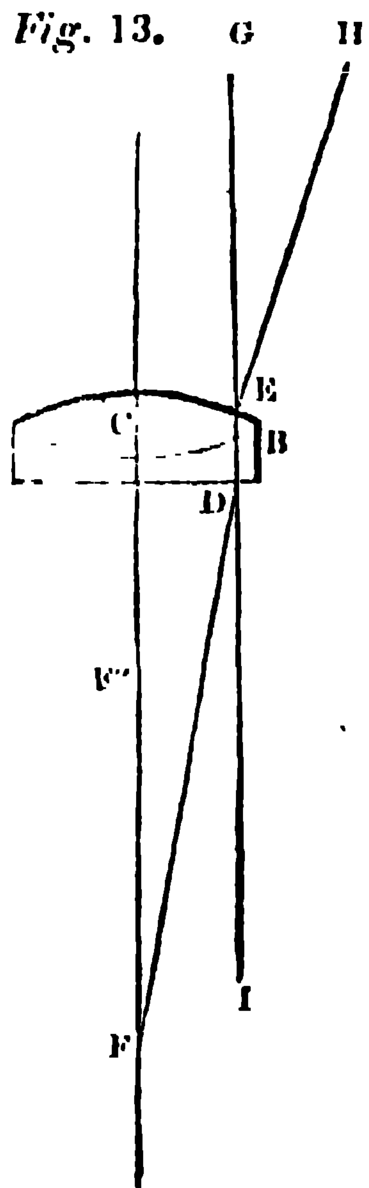
For some time prior to 1829 the subject had occupied the mind of a gentleman, who, not entirely practical, like the first, nor purely mathematical, like the last-mentioned class of inquirers, was led to the discovery of certain properties in achromatic combinations which had been before unobserved. These were afterwards experimentally verified; and in the year 1829 a paper on the subject, by the discoverer, Mr. Joseph Jackson Lister, was read and published by the Royal Society. The principles and results thus obtained enabled Mr. Lister to form a combination of lenses which transmitted a pencil of fifty degrees, with a large field correct in every part: as this paper was the foundation of the recent improvements in achromatic microscopes, and as its results are indispensable to all who would make or understand the instrument, we shall give the more important parts of it in detail, and in Mr. Lister's own words.

'I would premise that the plano-concave form for the correcting flint lens has in that quality a strong recommendation, particularly as it obviates the danger of error which otherwise exists in centring the two curves, and thereby admits of correct workmanship for a shorter focus. To cement together also the two surfaces of the glass diminishes by very nearly half the loss of light from reflexion, which is considerable at the numerous surfaces of a combination. I have thought the clearness of the field and brightness of the picture evidently increased by doing this; it prevents any dewiness or vegetation from forming on the inner surfaces; and I see no disadvantage to be anticipated from it if they are of identical curves, and pressed closely together, and the cementing medium permanently homogeneous.

'These two conditions then, that the flint lens shall be plano-concave, and that it shall be joined by some cement to the convex, seem desirable to be taken as a basis for the microscopic object-glass, provided they can be reconciled with the destruction of the spherical and chromatic aberrations of a large pencil.

'Now in every such glass that has been tried by me which has had its correcting lens of either Swiss or English glass, with a double convex of plate, and has been made achromatic by the form given to the outer curve of the convex, the

proportion has been such between the refractive and dispersive powers of its lenses, that its figure has been correct for rays issuing from some point in its axis not far from its principal focus on its plane side, and either tending to a conjugate focus within the tube of a microscope, or emerging nearly parallel.



'Let A B (*fig.* 13) be supposed such an object-glass, and let it be roughly considered as a plano-convex lens, with a curve A B C running through it, at which the spherical and chromatic errors are corrected which are generated at the two outer surfaces; and let the glass be thus free from aberration for rays F D E G issuing from the radiant point F, H E being a perpendicular to the convex surface, and I D to the plane one. Under these circumstances, the angle of emergence G E H much exceeds that of incidence F D I, being probably nearly three times as great.

If the radiant is now made to approach the glass, so that the course of the ray F D E G shall be more divergent from the axis, as the angles of incidence and emergence become more nearly equal to each other, the spherical aberration produced by the two will be found to bear a less proportion to the opposing error of the single correcting curve A C B; for such a focus therefore the rays will be over-corrected.

'But if F still approaches the glass, the angle of incidence continues to increase with the increasing divergence of the ray, till it will exceed that of emergence, which has in the meanwhile been diminishing, and at length the spherical error produced by them will recover its original proportion to the opposite error of the curve of correction. When F has reached this point F'' (at which the angle of incidence does not exceed that of emergence so much as it had at first come short of it), the rays again pass the glass free from spherical aberration.

'If F be carried from hence towards the glass, or outwards from its original place, the angle of incidence in the former case, or of emergence in the latter, becomes disproportionately effective, and either way the aberration exceeds the correction.

'These facts have been established by careful experiment: they accord with every appearance in such combinations of the plano-convex glasses as have come under my notice, and may, I believe, be extended to this rule, that in general an achromatic object-glass, of which the inner surfaces are in contact, or nearly so, will have on one side of it two foci in its axis, for the rays proceeding from which it will be truly corrected at a moderate aperture; that for the space between these two points its spherical aberration will be over-corrected, and beyond them either way under-corrected.

'The longer aplanatic focus may be found, when one of the plano-convex object-glasses is placed in a microscope, by shortening the tube, if the glass shows over-correction; if under-correction, by lengthening it, or by bringing the rays together, should they be parallel or divergent, by a very small good telescope. The shorter focus is got at by sliding the glass before another of sufficient length and large aperture that is finely corrected, and bringing it forwards till it gives the reflexion of a bright point from a globule of quicksilver, sharp and free from mist, when the distance can be taken between the glass and the object.

'The longer focus is the place at which to ascertain the utmost aperture that may be given to the glass, and where, in the absence of spherical error, its exact state of correction as to colour is seen most distinctly.

'The correction of the chromatic aberration, like that of the spherical, tends to excess in the marginal rays; so that if a glass which is achromatic, with a moderate aperture, has its cell opened wider, the circle of rays thus added to the pencil will be rather over-corrected as to colour.

'The same tendency to over-correction is produced, if, without varying the aperture, the divergence of the incident rays is much augmented, as in an object-glass placed in front of another; but generally in this position a part only of its aperture comes into use; so that the two properties mentioned neutralize each other, and its chromatic state remains unaltered. If for example the outstanding colours were observed at the longer focus to be green and claret, which show that the nearest practicable approach is made to the union of the spectrum, they usually continue nearly the same for the whole space between the foci, and for some distance beyond them either way.

'The places of those two foci and their proportions to each other depend on a variety of circumstances. In several object-glasses that I have had made for trial, plano-convex, with their inner surfaces cemented, their diameters the radius of the flint lens, and their colour pretty well corrected, those composed of dense flint and light plate have had the rays from the longer focus emerging nearly parallel; and this focus has been not quite three times the distance of the shorter from the glass: with English flint the rays have had more convergence, and the shorter focus has borne a rather less proportion to the longer.

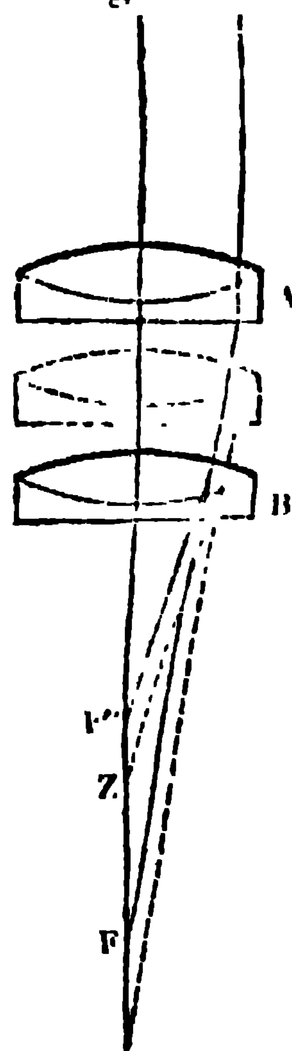
'If the surfaces are not cemented, a striking effect is produced by minute differences in their curves. It may give some idea of this, that in a glass of which nearly the whole disk was covered with colour from contact of the lenses, the addition of a film of varnish, so thin that this colour was not destroyed by it, caused a sensible change in the spherical correction.

'I have found that whatever extended the longer aplanatic focus, and increased the convergence of its rays, diminished the relative length of the shorter. Thus by turning to the concave lens the flatter instead of the deeper side of a convex lens, whose radii were to each other as 31 to 35, the pencil of the longer aplanatic focus, from being greatly divergent, was brought to converge at a very small distance behind the glass; and the length of the shorter focus, which had been one-half that of the longer, became but one-sixth of it.

'The direction of the aplanatic pencils appears to be scarcely affected by the differences in the thickness of glasses, if their state as to colour is the same.

'One other property of the double object-glass remains to be mentioned, which is, that when the longer aplanatic focus is used, the marginal rays of a pencil not coincident with the axis of the glass are distorted, so that a coma is thrown outwards; while the contrary effect of a coma directed towards the centre of the field is produced by the rays from the shorter focus. These peculiarities of the coma seem inseparable attendants on the two foci, and are as conspicuous in the achromatic meniscus as in the plano-convex object-glass.

'Of several purposes to which the particulars just given seem applicable, I must at present confine myself to the most obvious one. They furnish the means of destroying with the utmost ease both aberrations in a large focal pencil, and of thus surmounting what has hitherto been the chief obstacle to the perfection of the microscope. And when it is considered that the curves of its diminutive object-glasses have required to be at least as exactly proportioned as those of a large telescope to give the image of a bright point equally sharp and colourless, and that any change made to correct one aberration was liable to disturb the other, some idea may be formed of what the amount of that obstacle must have been. It will however be evident that if any object-glass is but made achromatic, with its lenses truly worked and cemented, so that their axes coincide, it may with certainty be connected with another possessing the same requisites and of suitable focus, so that the combination shall be free from spherical error also in the centre of its field. For this the rays have only to be received by the front glass B (*fig.* 14) from its shorter aplanatic focus F'', and transmitted in the direction of the longer correct pencil F A of the other glass A. It is desirable that the latter pencil should neither converge to a very short focus nor be more than very slightly if at all divergent; and a little attention at first to the kind of glass used will keep it within this range, the denser flint being suited to the glasses of shorter focus and larger angle of aperture.



'The adjustment of the microscope is then perfected, if necessary, by slightly varying the distance between the object-glasses; and after that is done, the length of the tube which carries the eye-pieces may be altered greatly without disturbing the correction, opposite errors which balance each other being produced by the change.

'If the two glasses which in the diagram are drawn at some distance apart are brought nearer together (if the place of A for instance is carried to the dotted figure), the rays transmitted by B in the direction of the longer aplanatic pencil of A will plainly be derived from some point Z more distant than F‴, and lying between the aplanatic foci of B; therefore (according to what has been stated) this glass, and consequently the combination, will then be spherically over-corrected. If on the other hand the distance between A and B is increased, the opposite effects are of course produced.

'In combining several glasses together it is often convenient to transmit an under-corrected pencil from the front glass, and to counteract its error by over-correction in the middle one.

'Slight errors in colour may in the same manner be destroyed by opposite ones; and on the principles described we not only acquire fine correction for the central ray, but, by the opposite effects at the two foci on the transverse pencil, all coma can be destroyed, and the whole field rendered beautifully flat and distinct.'

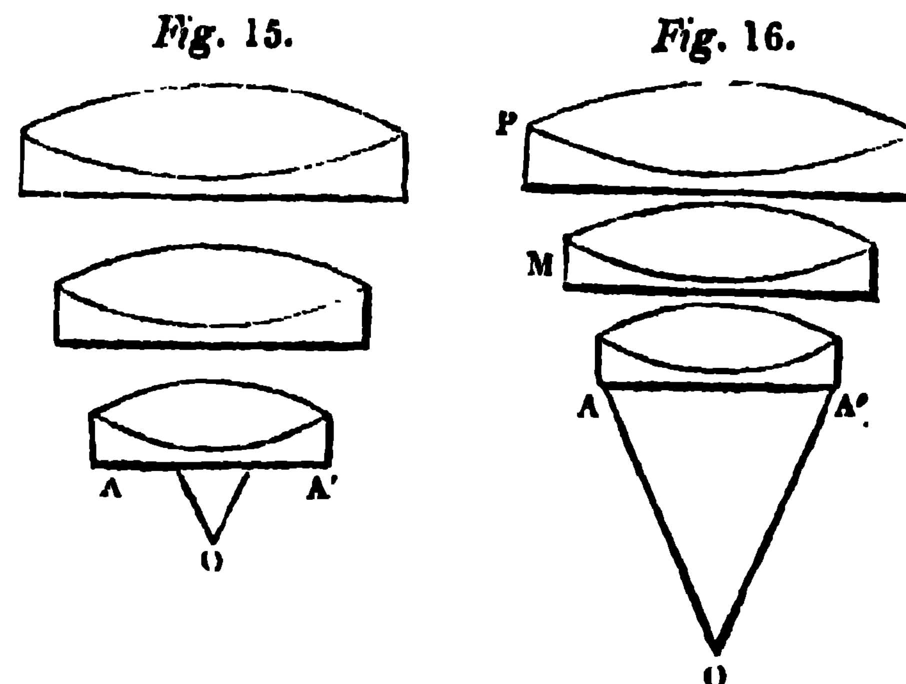
Mr. Lister's paper enters into further particulars, which are not essential to the comprehension of the subject. It is sufficient to say that his investigations and results proved to be of the highest value to the practical optician, and the progress of improvement was in consequence extremely rapid. The new principles were applied and exhibited by Mr. Hugh Powell and Mr. Andrew Ross with a degree of success which had never been anticipated; so perfect indeed were the corrections given to the achromatic object-glass—so completely were the errors of sphericity and dispersion balanced or destroyed—that the circumstance of covering the object with a plate of the thinnest glass or talc disturbed the corrections, if they had been adapted to an uncovered object, and rendered an object-glass which was perfect under one condition sensibly defective under the other.

This defect, if that should be called a defect which arose out of improvement, was first discovered by Mr. Ross, who immediately suggested the means of correcting it, and presented to the Society of Arts, in 1837, a paper on the subject, which was published in the 51st volume of their Transactions, and which, as it is, like Mr. Lister's, essential to a full understanding of the ultimate refinements of the instrument, we shall extract nearly in full.

'In the course of a practical investigation (says Mr. Ross) with the view of constructing a combination of lenses for the object-glass of a compound microscope, which should be free from the effects of aberration, both for central and oblique pencils of great angle, I combined the condition of the greatest possible distance between the object and object-glass; for in object-glasses of short focal length their closeness to the object has been an obstacle in many cases to the use of high magnifying powers, and is a constant source of inconvenience.

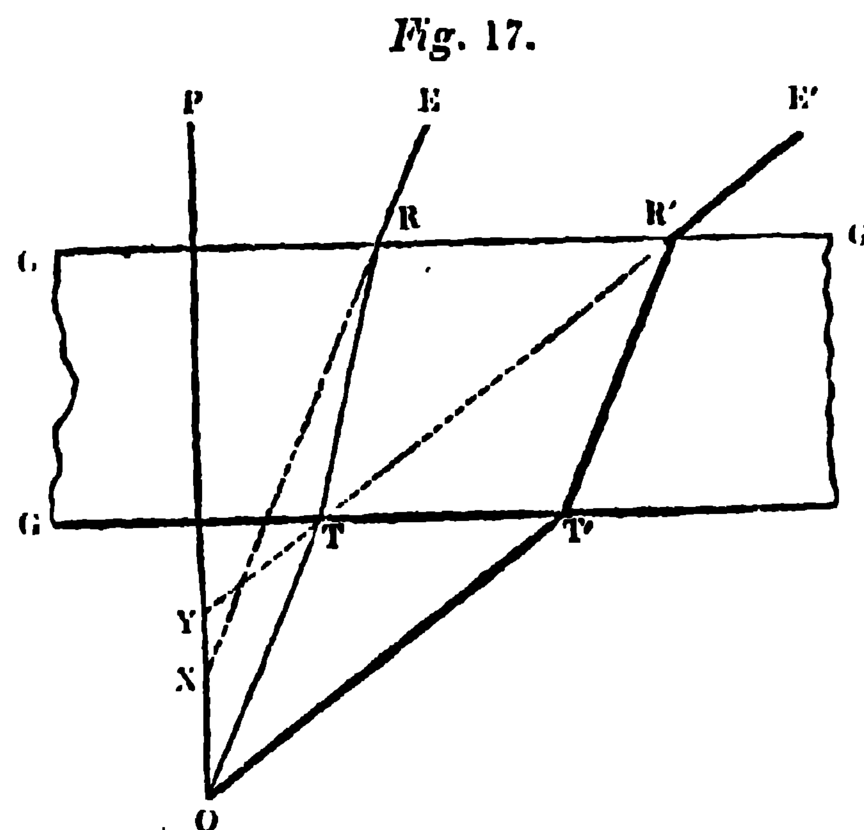
'In the improved combination, the diameter is only sufficient to admit the proper pencil; the convex lenses are wrought to an edge, and the concave have only sufficient thickness to support their figure; consequently, the combination is the thinnest possible, and it follows that there will be the greatest distance between the object and the object-glass. The focal length is $\frac{1}{8}$ of an inch, having an angular aperture of 60°, with a distance of $\frac{1}{25}$ of an inch, and a magnifying power of 970 times linear with perfect definition on the most difficult Podura scales. I have made object-glasses $\frac{1}{12}$ of an inch focal length; but as the angular aperture cannot be advantageously increased, if the greatest distance between the object and object-glass is preserved, their use will be very limited.

'The quality of the definition produced by an achromatic compound microscope will depend upon the accuracy with which the aberrations, both chromatic and spherical, are balanced, together with the general perfection of the workmanship. Now, in Wollaston's doublets, and Holland's triplets, there are no means of producing a balance of the aberrations, as they are composed of convex lenses only; therefore the best that can be done is to make the aberrations a minimum: the remaining positive aberration in these forms produces its peculiar effect upon objects (particularly the detail of the thin transparent class), which may lead to misapprehension of their true structure; but with the achromatic object-glass, where the aberrations are correctly balanced, the most minute parts of an object are accurately displayed, so that a satisfactory judgment of their character may be formed.



'It will be seen by *fig.* 15, that when a certain angular pencil A O A′ proceeds from the object O, and is incident on the plano side of the first lens, if the combination is removed from the object, as in *fig.* 16, the extreme rays of the pencil impinge on the more marginal parts of the glass, and as the refractions are greater here, the aberrations will be greater also. Now, if two compound object-glasses have their aberrations balanced, one being situated as in *fig.* 15, and the other as in *fig.* 16, and the same disturbing power applied to both, that in which the angles of incidence and the aberrations are small will not be so much disturbed as where the angles are great, and where consequently the aberrations increase rapidly.

'When an object-glass has its aberrations balanced for viewing an opaque object, and it is required to examine that object by transmitted light, the correction will remain; but if it is necessary to immerse the object in a fluid, or to cover it with glass or talc, an aberration will arise from these circumstances, which will disturb the previous correction, and consequently deteriorate the definition; and this effect will be more obvious with the increase of the distance between the object and the object-glass.



'The aberration produced with diverging rays by a piece of flat and parallel glass, such as would be used for covering an object, is represented at *fig.* 17, where G G G G is the refracting medium, or piece of glass covering the object O; O P, the axis of the pencil, perpendicular to the flat surfaces; O T, a ray near the axis; and O T′, the extreme ray of the pencil incident on the under surface of the glass: then T R, T′ R′, will be the directions of the rays in the medium, and R E, R′ E′, those of the emergent rays. Now if the course of these rays is continued, as by the dotted lines, they will be found to intersect the axis at different distances, X and Y, from the surface of the glass; and the distance X Y is the aberration produced by the medium which, as before stated, interferes with the previously balanced aberrations of the several lenses composing the object-glass. There are many cases of this, but the one here selected serves best to illustrate the principle. I need

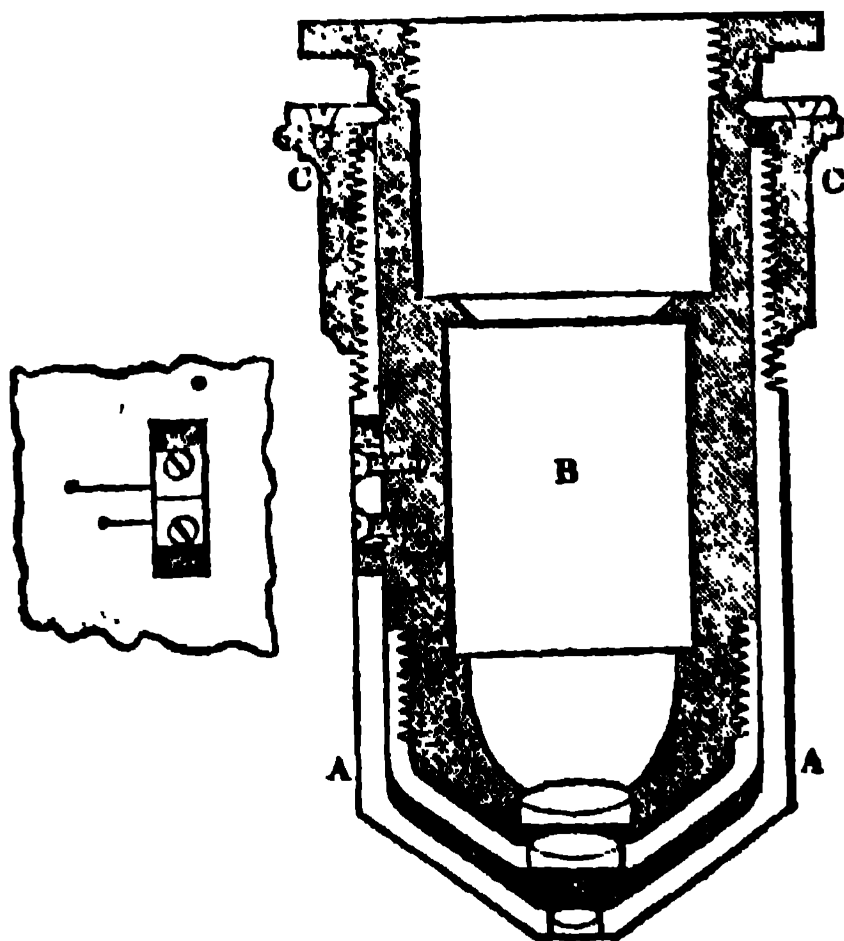
not encumber the description with the theoretical determination of this quantity, as it varies with exceedingly minute circumstances which we cannot accurately control; such as the distance of the object from the under side of the glass, and the slightest difference in the thickness of the glass itself; and if these data could be readily obtained, the knowledge would be of no utility in making the correction, that being wholly of a practical nature.

'If an object-glass is constructed as represented in *fig.* 16, where the posterior combination P and the middle M have together an excess of negative aberration, and if this be corrected by the anterior combination A, having an excess of positive aberration, then this latter combination can be made to act more or less powerfully upon P and M, by making it approach to or recede from them; for when the three are in close contact, the distance of the object from the object-glass is greatest; and consequently the rays from the object are diverging from a point at a greater distance than when the combinations are separated; and as a lens bends the rays more, or acts with greater effect, the more distant the object is from which the rays diverge, the effect of the anterior combination A upon the other two, P and M, will vary with its distance from thence. When therefore the correction of the whole is effected for an opaque object with a certain distance between the anterior and middle combination, if they are then put in contact, the distance between the object and object-glass will be increased; consequently the anterior combination will act more powerfully, and the whole will have an excess of positive aberration. Now the effect of the aberration produced by a piece of flat and parallel glass being of the negative character, it is obvious that the above considerations suggest the means of correction by moving the lenses nearer together, till the positive aberration thereby produced balances the negative aberration caused by the medium.

'The preceding refers only to the spherical aberration, but the effect of the chromatic is also seen when an object is covered with a piece of glass; for, in the course of my experiments, I observed that it produced a chromatic thickening of the outline of the Podura and other delicate scales; and if diverging rays near the axis and at the margin are projected through a piece of flat parallel glass, with the various indices of refraction for the different colours, it will be seen that each ray will emerge separated into a beam consisting of the component colours of the ray, and that each beam is widely different in form. This difference, being magnified by the power of the microscope, readily accounts for the chromatic thickening of the outline just mentioned. Therefore to obtain the finest definition of extremely delicate and minute objects, they should be viewed without a covering; if it be desirable to immerse them in a fluid, they should be covered with the thinnest possible film of talc, as, from the character of the chromatic aberration, it will be seen that varying the distances of the combinations will not sensibly affect the correction; though object-lenses may be made to include a given fluid or solid medium in their correction for colour.

'The mechanism for applying these principles to the correction of an object-glass under the various circumstances, is represented in *fig.* 18, where the anterior lens is set in the end of a tube A A, which slides on the cylinder B containing the remainder of the combination; the tube A A, holding the lens nearest the object, may then be moved upon the cylinder B, for the purpose of varying the distance according to the thickness of the glass covering the object, by turning the screwed ring C C, or more simply by sliding the one on the other, and clamping them together when adjusted. An aperture is made in the tube A, within which is seen a mark engraved on the cylinder, and on the edge of which are two marks, a longer and a shorter, engraved upon the tube. When the mark on the cylinder coincides with the longer mark on the tube, the adjustment is perfect for an uncovered object; and when the coincidence is with the short mark, the proper distance is obtained to balance the aberrations produced by glass $\frac{1}{150}$th of an inch thick, and such glass can be readily supplied.

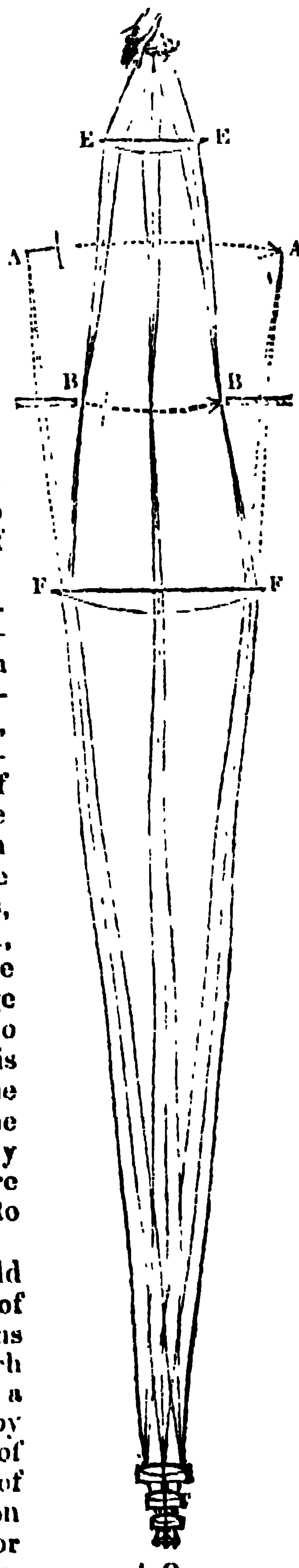
Fig. 18.



'It is hardly necessary to observe, that the necessity for this correction is wholly independent of any particular construction of the object-glass; as in all cases where the object-glass is corrected for an object uncovered, any covering of glass will create a different value of aberration to the first lens, which previously balanced the aberration resulting from the rest of the lenses; and, as this disturbance is effected at the first refraction, it is independent of the other part of the combination. The visibility of the effect depends on the distance of the object from the object-glass, the angle of the pencil transmitted, the focal length of the combination, the thickness of the glass covering the object, and the general perfection of the corrections for chromatism and the oblique pencils.

'With this adjusting object-glass, therefore, we can have the requisites of the greatest possible distance between the object and object-glass, an intense and sharply defined image throughout the field from the large pencil transmitted, and the accurate correction of the aberrations; also, by the adjustment, the means of preserving that correction under all the varied circumstances in which it may be necessary to place an object for the purpose of observation.'

Fig. 19.

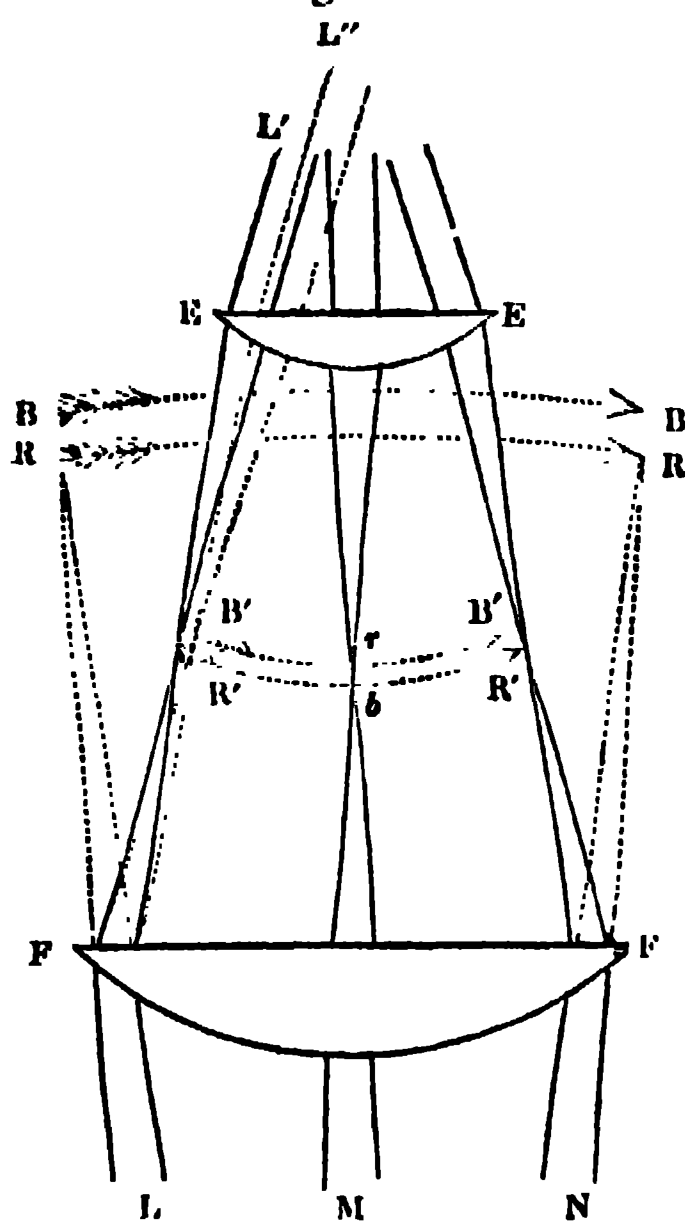


In the annexed engraving, *fig.* 19, we have shown the triple achromatic object-glass in connection with the eye-piece consisting of the field-glass F F and the eye-glass E E, forming together the modern achromatic microscope. The course of the light is shown by drawing three rays from the centre and three from each end of the object O. These rays would, if left to themselves, form an image of the object at A A, but being bent and converged by the field-glass F F, they form the image at B B, where a stop is placed to intercept all light except what is required for the formation of the image. From B B therefore the rays proceed to the eye-glass exactly as has been described in reference to the simple microscope and to the compound of two glasses.

If we stopped here we should convey a very imperfect idea of the beautiful series of corrections effected by the eye-piece, and which were first pointed out in detail in a paper on the subject published by Mr. Varley in the 51st volume of the Transactions of the Society of Arts. The eye-piece in question was invented by Huyghens for telescopes, with no other view than that of diminishing the spherical aberration by producing the refractions at two glasses instead of one, and of increasing the field of view. It was reserved for Boscovich to

point out that Huyghens had by this arrangement accidentally corrected a great part of the chromatic aberration, and this subject is further investigated with much skill in two papers by Professor Airy in the *Cambridge Philosophical Transactions*, to which we refer the mathematical reader. These investigations apply chiefly to the telescope, where the small pencils of light and great distance of the object exclude considerations which become important in the microscope, and which are well pointed out in Mr. Varley's paper before mentioned.

Fig. 20.

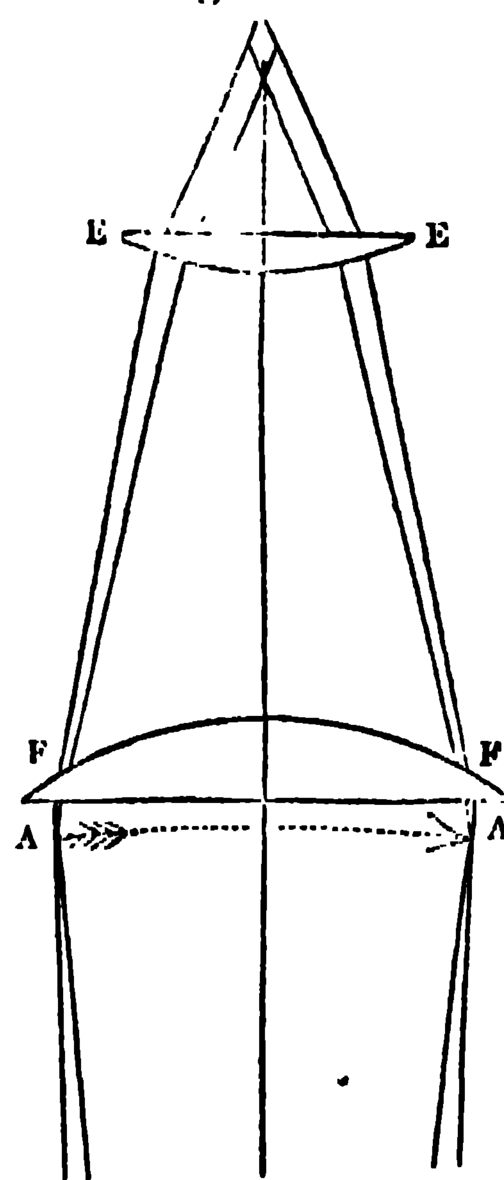


Let *fig.* 20 represent the Huyghenean eye-piece of a microscope; F F and E E being the field-glass and eye-glass, and L M N the two extreme rays of each of the three pencils, emanating from the centre and ends of the object, of which, but for the field-glass, a series of coloured images would be formed from R R to B B; those near R R being red, those near B B blue, and the intermediate ones green, yellow, and so on, corresponding with the colours of the prismatic spectrum. This order of colours, it will be observed, is the reverse of that described in treating of the common compound microscope (*fig.* 12), in which the single object-glass projected the red image beyond the blue. The effect just described, of projecting the blue image beyond the red, is purposely produced for reasons presently to be given, and is called over-correcting the object-glass as to colour. It is to be observed also that the images B B and R R are curved in the wrong direction to be distinctly seen by a convex eye-lens, and this is a further defect of the compound microscope of two lenses. But the field-glass, at the same time that it bends the rays and converges them to foci at B′B′ and R′R′, also reverses the curvature of the images as there shown, and gives them the form best adapted for distinct vision by the eye-glass E E. The field-glass has at the same time brought the blue and red images closer together, so that they are adapted to pass uncoloured through the eye-glass. To render this important point more intelligible, let it be supposed that the object-glass had not been over-corrected, that it had been perfectly achromatic; the rays would then have become coloured as soon as they had passed the field-glass; the blue rays, to take the central pencil for example, would converge at *b* and the red rays at *r*, which is just the reverse of what the eye-lens requires; for as its blue focus is also shorter than its red, it would demand rather that the blue image should be at *r* and the red at *b*. This effect we have shown to be produced by the over-correction of the object-glass, which protrudes the blue foci B B as much beyond the red foci R R as the sum of the distances between the red and blue foci of the field-lens and eye-lens; so that the separation B R is exactly taken up in passing through those two lenses, and the whole of the colours coincide as to focal distance as soon as the rays have passed the eye-lens. But while they coincide as to distance, they differ in another respect; the blue images are rendered smaller than the red by the superior refractive power of the field-glass upon the blue rays. In tracing the pencil L for instance, it will be noticed that after passing the field-glass, two sets of lines are drawn, one whole, and one dotted, the former representing the red, and the latter the blue rays. This is the accidental effect in the Huyghenean eye-piece pointed out by Boscovich. This separation into colours at the field-glass is like the over-correction of the object-glass; it leads to a subsequent complete correction. For if the differently coloured rays were kept together till they reached the eye-glass, they would then become coloured, and present coloured images to the eye; but fortunately, and most beautifully, the separation effected by the field-glass causes the blue rays to fall so much nearer the centre of the eye-glass, where, owing to the spherical figure, the refractive power is less than at the margin, that the spherical error of the eye-lens constitutes a nearly perfect balance to the chromatic dispersion of the field-lens, and the red and blue rays L′ and L″ emerge sensibly parallel, presenting, in consequence, the perfect definition of a single point to the eye. The same reasoning is true of the intermediate colours and of the other pencils.

From what has been stated it is obvious that we mean by an achromatic object-glass one in which the usual order of dispersion is so far reversed, that the light, after undergoing the singularly beautiful series of changes effected by the eye-piece, shall come uncoloured to the eye. We can give no specific rules for producing these results. Close study of the formulæ for achromatism given by the celebrated mathematicians we have quoted will do much, but the principles must be brought to the test of repeated experiment. Nor will the experiments be worth anything, unless the curves be most accurately measured and worked, and the lenses centred and adjusted with a degree of precision which, to those who are familiar only with telescopes, will be quite unprecedented.

The Huyghenean eye-piece which we have described is the best for merely optical purposes, but when it is required to measure the magnified image, we use the eye-piece invented by Mr. Ramsden, and called, from its purpose, the micrometer eye-piece. When it is stated that we sometimes require to measure portions of animal or vegetable matter a hundred times smaller than any divisions that can be artificially made on any measuring instrument, the advantage of applying the scale to the magnified image will be obvious, as compared with the application of engraved or mechanical micrometers to the stage of the instrument.

Fig. 21.



The arrangement is shown in *fig.* 21, where E E and F F are the eye and field glass, the latter having now its plane face towards the object. The rays from the object are here made to converge at A A, immediately in front of the field-glass, and here also is placed a plane glass on which are engraved divisions of $\frac{1}{500}$th of an inch or less. The markings of these divisions come into focus therefore at the same time as the image of the object, and both are distinctly seen together. Thus the measure of the magnified image is given by mere inspection, and the value of such measures in reference to the real object may be obtained thus, which, when once obtained, is constant for the same object-glass. Place on the stage of the instrument a divided scale the value of which is known, and viewing this scale as the microscopic object, observe how many of the divisions on the scale attached to the eye-piece correspond with one of those in the magnified image. If, for instance, ten of those in the eye-piece correspond with one of those in the image, and if the divisions are known to be equal, then the image is ten times larger than the object, and the dimensions of the object are ten times less than indicated by the micrometer. If the divisions on the micrometer and on the magnified scale were not equal, it becomes a mere rule-of-three sum, but in general this trouble is

taken by the maker of the instrument, who furnishes a table showing the value of each division of the micrometer for every object-glass with which it may be used.

While on the subject of measuring it may be well to explain the mode of ascertaining the magnifying power of the compound microscope, which is generally taken on the assumption before mentioned, that the naked eye sees most distinctly at the distance of ten inches.

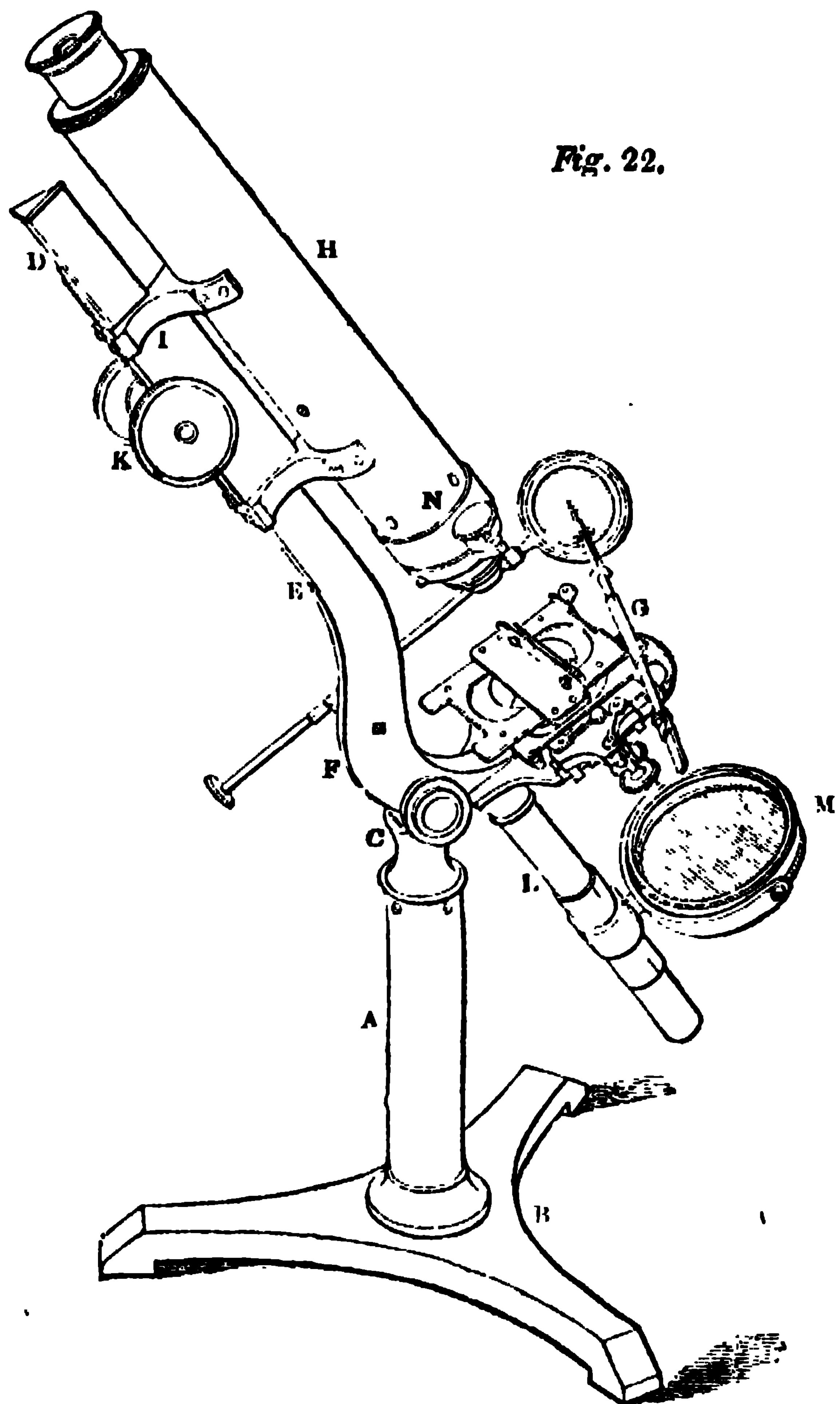
Place on the stage of the instrument, as before, a known divided scale, and when it is distinctly seen, hold a rule at ten inches distance from the disengaged eye, so that it may be seen by that eye, overlapping or lying by side of the magnified picture of the other scale. Then move the rule till one or more of its known divisions correspond with a number of those in the magnified scale, and a comparison of the two gives the magnifying power.

Having now explained the optical principles of the achromatic compound microscope, it remains only to describe the mechanical arrangements for giving those principles their full effect. The mechanism of a microscope is of much more importance than might be imagined by those who have not studied the subject. In the first place, steadiness, or freedom from vibration, and most particularly freedom from any vibrations which are not equally communicated to the object under examination, and to the lenses by which it is viewed, is a point of the utmost consequence. When, for instance, the body containing the lenses is screwed by its lower extremity to a horizontal arm, we have one of the most vibratory forms conceivable; it is precisely the form of the inverted pendulum, which is expressly contrived to indicate otherwise insensible vibrations. The tremor necessarily attendant on such an arrangement is magnified by the whole power of the instrument; and as the object on the stage partakes of this tremor in a comparatively insensible degree, the image is seen to oscillate so rapidly, as in some cases to be wholly undistinguishable. Such microscopes cannot possibly be used with high powers in ordinary houses abutting on any paved streets through which carriages are passing, nor indeed are they adapted to be used in houses in which the ordinary internal sources of shaking exist.

One of the best modes of mounting a compound microscope is shown in the annexed view (*fig.* 22), which, though too minute to exhibit all the details, will serve to explain the chief features of the arrangement.

A massy pillar A is screwed into a solid tripod B, and is surmounted by a strong joint at C, on which the whole instrument turns, so as to enable it to take a perfectly horizontal or vertical position, or any intermediate angle, such, for instance, as that shown in the engraving.

This moveable portion of the instrument consists of one solid casting D E F G; from F to G being a thick pierced plate carrying the stage and its appendages. The compound body H is attached to the bar D E, and moves up and down upon it by a rack and pinion worked by either of the milled heads K. The piece D E F G is attached to the pillar by the joint C, which being the source of the required movement in the instrument, is obviously its weakest part, and about which no doubt considerable vibration takes place. But inasmuch as the piece D E F G of necessity transmits such vibrations equally to the body of the microscope and to the objects on the stage, they hold always the same relative position, and no *visible* vibration is caused, how much soever may really exist. To the under side of the stage is attached a circular stem L, on which slides the mirror M, plane on one side and concave on the other, to reflect the light through the aperture in the stage. Beneath the stage is a circular revolving plate containing three apertures of various sizes, to limit the angle of the pencil of light which shall be allowed to fall on the object under examination. Besides these conveniences the stage has a double movement produced by two racks at right angles to each other, and worked by milled heads beneath. It has also the usual appendages of forceps to hold minute objects, and a lens to condense the light upon them, all of which are well understood, and if not, will be rendered more intelligible by a few minutes' examination of a microscope than by the most lengthened description. One other point remains to be noticed. The movement produced by the milled head K is not sufficiently delicate to adjust the focus of very powerful lenses, nor indeed is any rack movement. Only the finest screws are adapted to this purpose; and even these are improved by means for reducing the rapidity of the



screw's movement. For this purpose the lower end of the compound body H, which carries the object-glass, consists of a piece of smaller tube sliding in parallel guides in the main body, and kept constantly pressed upwards by a spiral spring, but it can be drawn downward by a lever crossing the body, and acted on by an extremely fine screw whose milled head is seen at N, and the fineness of which is tripled by means of the lever through which it acts on the object-glass. The instrument is of course roughly adjusted by the rack movement, and finished by the screw, or by such other means as are chosen for the purpose. One very ingenious contrivance, but applied to the stage instead of the body of the microscope, invented by Mr. Powell, will be found described in the 50th volume of the Transactions of the Society of Arts.

The greater part of the directions for viewing and illuminating objects given in reference to the simple microscope are applicable to the compound. An argand lamp placed in the focus of a large detached lens so as to throw parallel rays upon the mirror, is the best artificial light: and for opaque objects the light so thrown up may be reflected by metallic specula (called, from their inventor, Lieberkhuns) attached to the object-glasses.

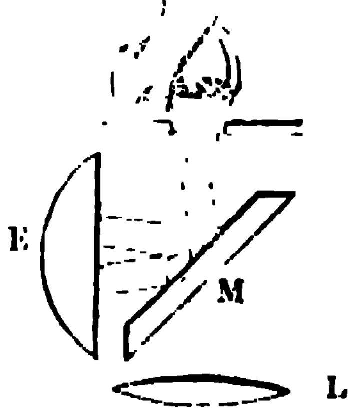
It has been recently proposed by Sir David Brewster and by M. Dujardin to render the Wollaston condenser achromatic, and they have accordingly been made with three pairs of achromatic lenses instead of the single lens before described, with very excellent effect. The last mentioned gentleman has also projected an ingenious apparatus, called the Hyptioscope, attached to the eye-piece for the purpose of erecting the magnified picture.

The erector commonly applied to the compound microscope consists of a pair of lenses acting like the erecting eye-piece of the telescope. But this, though it is convenient for the purpose of dissection, very much impairs the optical performance of the instrument.

For drawing the images presented by the microscope the best apparatus consists of a mirror M (*fig.* 23), composed of a thin piece of rather dark-coloured glass cemented on to

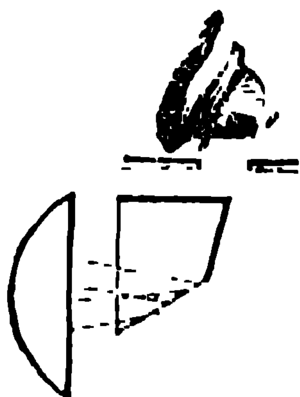
a piece of plate-glass inclined at an angle of 45° in front of the eye-glass E. The light escaping from the eye-glass is assisted in its reflection upwards to the eye by the dark glass, which effects the further useful purpose of rendering the paper less brilliant, and thus enabling the eye better to see the reflected image. The lens L below the reflector is to cause the light from the paper and pencil to diverge from the same distance as that received from the eye-glass; in other words, to cause it to reach the eye in parallel lines.

Fig. 23.



Dr. Wollaston's Camera Lucida, as shown in *fig.* 24, is sometimes attached to the eye-piece of the microscope for the same purpose. In this instrument the rays suffer two internal reflexions within the glass prism, as will be seen explained in the article CAMERA LUCIDA. In this minute figure we have omitted to trace the reflected rays, merely to avoid confusion.

Fig. 24



Annexed are four engravings of microscopic objects, the true character of which it is however impossible to give in wood, and is difficult indeed to accomplish by any description of engraving.

Fig. 25.

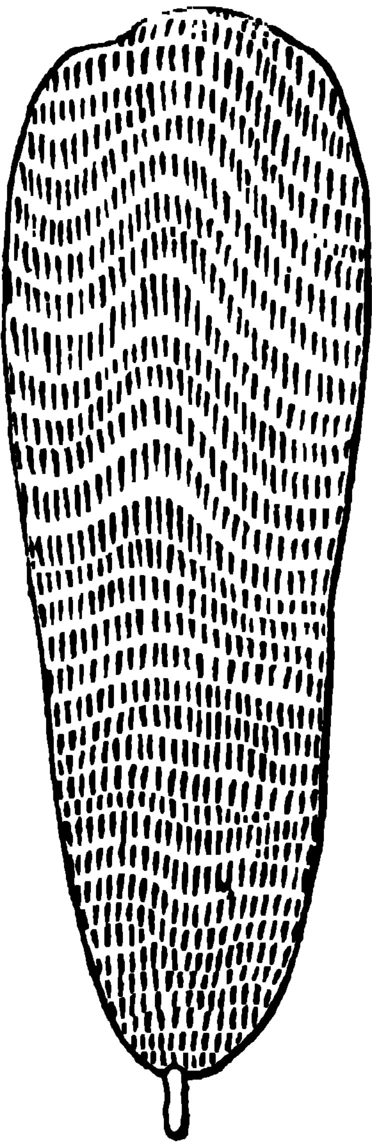


Fig. 26.

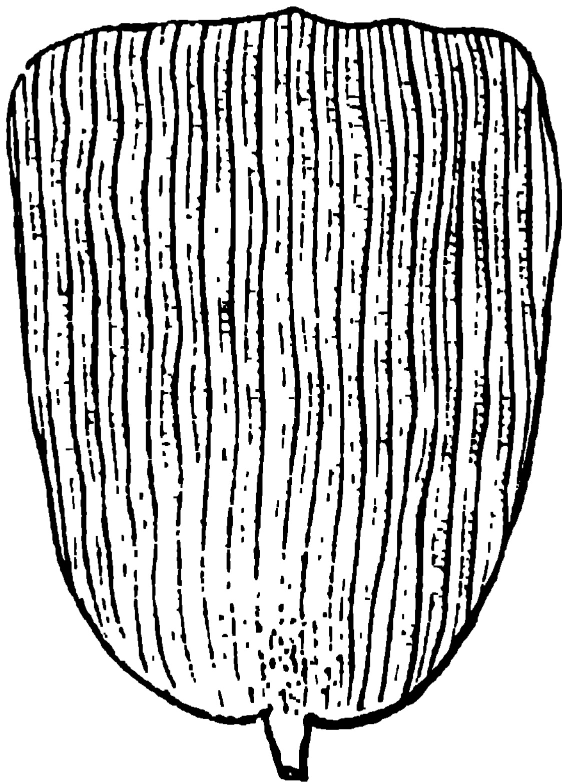


Fig. 27.

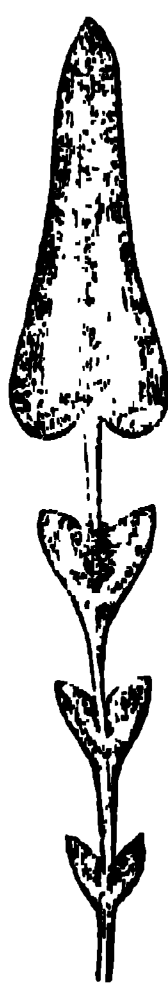
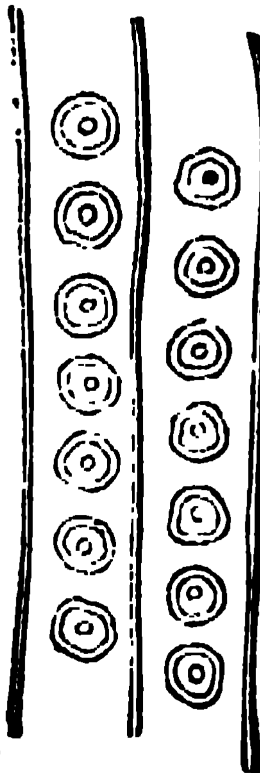


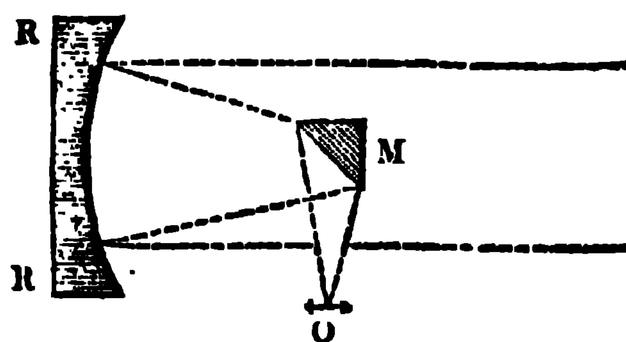
Fig. 25 shows a scale of the small insect called Podura Plumbea, the common Skiptail, magnified about five hundred times. To define the markings on this scale clearly is the highest test of a deep achromatic object-glass; and this drawing is given rather to explain what the observer should look for, than as a very correct representation. *Fig.* 26 is a scale or feather of the Menelaus Butterfly; *Fig.* 27 is the hair of a singular insect, the Dermestes; and *Fig.* 28 is a longitudinal cutting of fir, showing the circular glands on the vessels which distinguish coniferous woods. These latter objects may be seen by half-inch or quarter-inch achromatic glasses. Opaque objects are generally better exhibited by inch and two-inch glasses when a general view of them is required, and by higher powers when we wish to examine their minute structure. In the latter case the light must be obtained by condensing lenses instead of the metallic specula.

Fig. 28.



Although the reflecting microscope is now very little used, it may be expected that we should mention it. In this instrument, at *Fig.* 29, the object O is reflected by the inclined face of the mirror M, and the rays are again reflected and converged by the ellipsoidal reflector R R, which effects the same purpose as the object-glass of the compound microscope. It forms an image which is not susceptible of the over-correction as to colour before described, and which therefore becomes coloured in passing through the eye-piece. This fact, and the loss of light by reflection, will probably always render the reflecting microscope inferior to the achromatic refracting.

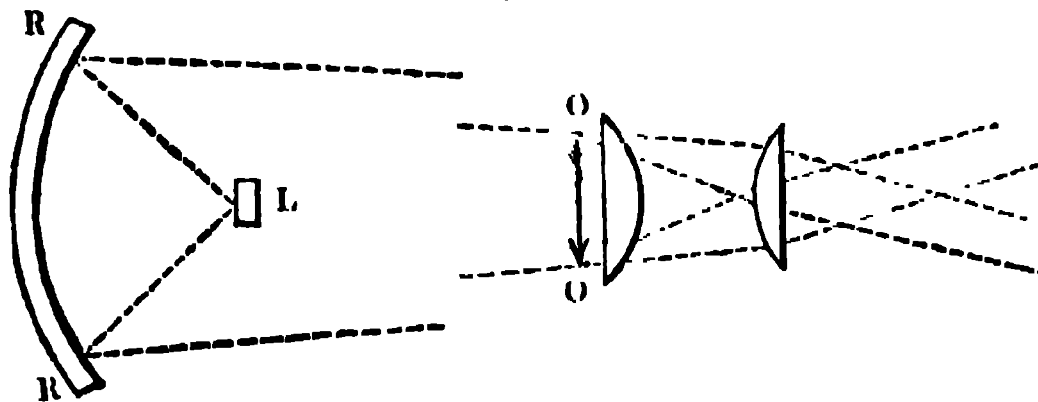
Fig. 29.



The solar microscope has been so nearly superseded by the oxy-hydrogen, that a brief description of the latter must suffice, particularly as their optical principles are similar.

The primary object in both is to throw an intense light upon the object, which is sometimes done by mirrors, and sometimes by lenses. In *fig.* 30, L represents the cylinder

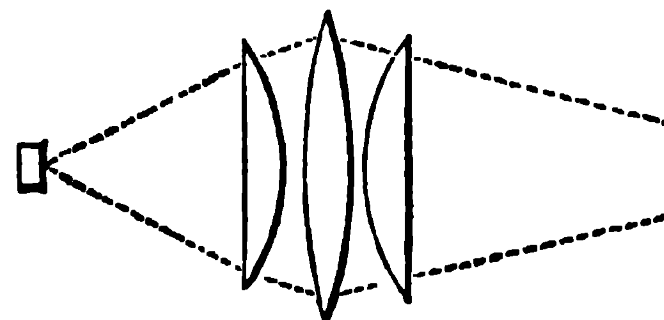
Fig 30.



of burning lime, R R the reflector, which concentrates the light upon the object O O; the rays from which, passing through the two plano-convex lenses, are brought to foci upon a screen placed at a great distance, and upon which is formed the magnified image.

Fig. 31 shows a combination of lenses to condense the light upon the object. In either case the optical arrangements by which the image is formed admit of the same perfection as those which have been described for the compound microscopes. A few achromatic glasses for oxy-hydrogen microscopes have been made, and they will ultimately become valuable instruments for illustrating lectures on natural history and physiology. One made by Mr. Ross was exhibited a few months since at the Society of Arts to illustrate a lecture on the physiology of woods. It should be observed however that the oxy-hydrogen or solar microscope requires either a spherical screen, or that the objects should be mounted between spherical glasses, in order to bring the whole into focus at one time. This latter plan was adopted on the occasion just mentioned with perfect success.

Fig. 31.



MICROSCO'PIUM (the Microscope), a constellation of Lacaille, situated above Grus and Indus at the junction of Capricornus and Sagittarius. The only star in it worth notice is *α*, of the 4½ magnitude, (307) in the catalogue of Piazzi, and 2454 in that of the Astronomical Society.

MICRO'TUS, Schrank's name for a genus of Murine Rodents, embracing our English Water-rat, *Mus amphibius*, Linn., &c. [MURIDÆ.]

MICROZOA'RIA (literally, 'little animals'). This is the title employed by M. de Blainville for the Animalcula infusoria of earlier writers, who commonly classed these singular objects of microscopic research among the Zoophyta. Baker, Needham, Buffon, and Spallanzani, occupied with the singular facts and hypotheses regarding the origin and vitality of these animated points, gave little attention to their zoological relations; the works of Linnæus contain almost no notice of more than the larger Vorticellæ, Brachioni, and Volvoces, which are ranked among the Vermes Zoophyta. The great founder of all the classifications of the minute Infusoria, the first careful observer of their permanent

characters of form, surface, movements, and internal structure, is the accurate O. F. Müller, author of the 'Zoologia Danica.' Considering that in 1786 (the date of his work) the microscope had been scarcely at all improved since the days of Hooke, the numerous figures which Müller presented were highly creditable to his eye and hand. They have been frequently copied (as in the 'Encyclopédie Méthodique'), and yet retain a high value.

Müller's classification, founded upon the figure and surface of the animal, is convenient to the observer who desires to name the active molecules which pass under his microscope, but unsatisfactory to the zoological student.

The genera are arranged in some degree according to their apparent simplicity.

A. Without external organs.

* Substance thick.

Monas. A mere point.
Proteus. Of variable figure.
Volvox. Spherical.
Enchelis. Cylindrical.
Vibrio. Round, elongated. (Several of the animals included in this group should have been ranked among the Vermes.)

* Membranaceous.

Cyclidium. Oval, complanate (generate by division).
Paramecium. Of an oblong figure (generate by division).
Kolpoda. Sinuate, complanate (generate by division).
Gonium. An angular mass.
Bursaria. Hollow like a purse.

B. With external organs.

* Naked.

Cercaria. With an extension like a tail. Some are said to have eyes.
Trichoda. Named for its hairiness (generate by division).
Kerona. With little horny protuberances.
Himantopus. With slender extensions or cirri.
Leucophra. Ciliated over all the surface (generate by division).
Vorticella. Ciliated about the mouth, contractile. The ciliæ have a whirling motion.

** Covered with a shell.

Brachionus. Ciliated nearly as Vorticella.

On this classification Lamarck (*Anim. sans Vertèbres*) has made few alterations; he preserves the same genera nearly in the same order in all the naked Infusoria, but rejects from those with external organs (Infusoires appendiculés) Vorticella and Brachionus (which he places among his Polypi), and re-arranges the others thus:

Infusoires appendiculés.

No tail { *Trichoda* (including Leucophra of Müller). *Kerona* (including Himantopus of Müller).
A tail { *Cercaria.* *Furcocercaria.*

The remaining groups are thus classed among the Polypi:

Polypi ciliati.

Section I. Vibratiles with oral ciliæ, having vibratory movement.
Rattulus. (Trichoda rattus and T. clavus of Müller.)
Trichocerca. (Cercaria forcipata, &c., Müller.)
Vaginicola. Trichoda inquilina, &c., Müller)
Section II. Rotiferæ, with oval ciliæ having rotatory movement.
Folliculina. (Vorticella ampulla, vaginata, &c., Müller.)
Brachionus. (Divided into sections, with or without a tail.)
Furcularia. (Includes the Vorticella rotatoria, or wheel-animal and others allied to it.)
Urceolaria. (Vorticella viridis, bursaria, &c., Müller.)
Vorticella. (The pedunculated species of Müller, both simple and compound.)
Tubicolaria.

Cuvier constitutes for the Infusoria his fifth and last class of zoophyta, observing however, what always struck the least informed zoologist, who contemplated the various forms and habits of these animals, that among them were several grades of organization, and some forms which could not be reconciled to zoophytic structure. Bory de St. Vincent had adopted (*Encyclop. Méthod.*, 1826) eighty-two genera, but Cuvier even reduces the number of Lamarckian genera.

Blainville (*Actinologie*, p. 162) gives the following arrangement of the Microzoaria.

Division I. Microzoaria Heteropoda.

Section 1. Rotiferæ. Body distinguished in parts anterior, medial, posterior (sometimes really showing head, thorax, abdomen), with anterior bundles of ciliæ, which in their rapid movement resemble wheels. Posterior appendices simple, terminal.

The genera are as in Lamarck, with indications of the subgenera adopted by Bory de St. Vincent.

Section 2. Ciliferæ, with lateral ciliiform appendices. The genera are taken from Müller, viz. Kerona, Himantopus, Paramæcium, Trichoda, Leucophra, Volvox, Cyclidium, Monas, with indications of the subdivisions adopted by Bory de St. Vincent, &c.

Division II. Microzoaria apoda, with no external appendices, including Bursaria, Kolpoda, Trachelina (Vibrio, Müller), Proteus, Cercaria, Enchelis, Gonium. Many of these are thought by Blainville to be young Planariæ or Hirudines.

Nearly all the real information which accompanied these slight transformations of Müller's system of classification was derived from the numerous and acute observations of that eminent naturalist, whose figures and descriptions we have often compared with the indications of the microscope before this instrument received the marvellous improvements of Amici, Chevalier, Pritchard, Plösl, and Schiek. By their inventions, and the able use made of them since 1828, a new mine of knowledge has been opened on the history, structure, and zoological relations of the Infusoria. Professor Ehrenberg of Berlin has been highly successful in detecting unexpected points of structure even in the minutest animalculæ, and has in consequence proposed a new and remarkable classification, depending on a great variety of organizations, which he has discovered and already in a considerable degree made known. (*Organization der Infusionthierchen*, Berlin, 1830; *Ann. des Sciences Naturelles*, 183-; Taylor's *Scientific Memoirs*, 1837.)

The fundamental division proposed by Ehrenberg gives two distinct classes of Infusoria, viz. those which appear to have in their body a complicated digestive cavity, consisting of a great number of cells [POLYGASTRICA], and those which have a simple digestive sac, and wheel-organs about the mouth. [ROTATORIA.] To these articles the reader is referred for a full statement of Ehrenberg's latest classification.

MICRU'RA. [VIPERIDÆ.]

MI'CTYRIS. [PINNOTHERIANS.]

MIDAS (Zoology), M. Geoffroy's name for a subgenus of the small South American monkeys called *Ouistitis*. [JACCHUS.] The common name for the species of this subgenus is *Tamarin*.



Midas Rosalia.

Subgeneric Character.—Muzzle short, facial angle 60°,

forehead with an appearance of prominence, arising from the great angle of the upper edge of the orbits. Upper incisors contiguous, under incisors same size as the upper. Nails like claws, excepting those on the thumbs behind; tail as in *Jacchus*. General dental formula as in *Jacchus*.

There are seven species, of which we select as the example *Midas Rosalia*, the *Marakina*, or *Silky Tamarin*.

Description.—This pretty little monkey is entirely of a golden yellow, varying to a redder tint, and palest on the back and thighs. The hair, which is fine and silky, is so long about the head and neck as to form a ruff or mane, whence it has been called the Lion-monkey. Its beauty and gentleness render it a very interesting pet; but great care is required to keep it from damp, which is destructive to it. It is supposed to live almost entirely on trees, and to be squirrel-like in its habits.

Locality.—Guyana, and the south of Brazil from Rio Janeiro to Cape Frio.

Desmarest notices a red and black variety (Guyana), and one of a bright shining red from Brazil.

N.B. This must not be confounded with *Midas Leonina*, *Simia leonina*, Humb., the *Leoncito*, or *Leonine Tamarin*, which is probably the smallest monkey known. The last is brownish, and has a very well developed mane of that colour, which it bristles up when angry, so as to look like a little lion. The face is black, the mouth white, and the tail black above and white below. It inhabits the plains bordering the eastern slope of the Cordillera, and is rare.

MIDAS'S EAR. [AURICULA.]

MIDDELBURG. [ZEELAND.]

MIDDLE LATITUDE (Navigation), the mean of two latitudes. It is the distinctive name of a method called in navigation middle latitude sailing, which means, that in estimating the difference of longitude by means of the differences of latitude and the intermediate departure, this departure is supposed to be an arc of a parallel of longitude at the intermediate or middle latitude. (Riddle's *Navigation*, in which a table may be found corrective of the results.)

MIDDLE VOICE is a term employed in Greek grammar to indicate a class of verbs which are called reflective in some other languages. The reflective meaning is supposed to be the original and main signification of the middle voice, but it is difficult in many of the middle verbs in Greek to trace the reflective notion. Although a separate voice, that is, a distinct mode of conjugation has been assigned to verbs with a middle signification, there are only two tenses in the Greek verb which have a form peculiar to the middle notion, namely, the first and second aorists in σαμην and ομην; which, in the model verb, are ἐτυψάμην and ἐτυπόμην. There are four tenses peculiar to the passive signification, namely, the two futures in θησομαι and ησομαι, and the two aorists in θην and ην (τυφ-θήσομαι, τυπ-ήσομαι, ἐτύφ-θην, ἐτύπ-ην). The future in σομαι (τύπ-σομαι, λέγ-σομαι), which is called in most grammars the future middle, has a passive signification, as well as a middle. (Monk on Eurip., *Hippol.*, l.1458; *Quarterly Journal of Education*, vol. iv., p. 158.) The following table will make the matter clearer:—

Tenses common to the passive and middle significations.

Present	τύπτομαι.	Perfect	τέτυμμαι.
Imperfect	ἐτυπτόμην.	Past Perfect	ἐτετύμμην.
Future	τύψομαι.	Future Perfect	τετύψομαι.

Tenses peculiar to the middle signification.

1st Aorist	ἐτυψάμην.	2nd Aorist	ἐτυπόμην.

Tenses peculiar to the passive signification.

1st Aorist	ἐτύφθην.	2nd Aorist	ἐτύπην.
1st Future	τυφθήσομαι.	2nd Future	τυπήσομαι.

Since then so many tenses in the Greek verb have the same form both for the middle and passive signification, it becomes an interesting object of inquiry, whether we should assign the priority to the passive or middle notion? This question has usually been answered by grammarians in favour of the passive; but the comparison of other languages etymologically connected with the Greek, would lead us to a contrary supposition. Very few of the Indo-Germanic languages have a form peculiar to the passive signification; even in Sanskrit the passive verb is not considered by Hindu grammarians as a distinct voice, but is classed among the derivative verbs. There are however two voices in the Sanskrit verb, answering to the Greek active and middle, which are called respectively *parasmaipadum* and *atmanêpadum;* the former answering to the active in Greek, and the latter having generally a reflective or medial but never a passive signification. The tenses of the passive verb are formed by prefixing the syllable *ya* to the person endings of the *atmanêpadum* conjugation. These person endings are evidently the same as those of the middle voice in Greek, as the following table of the present tense will show:—

	Sanskrit.	Greek.
Singular.	kship-ê	τύπτ-ο, μαι.
	kship-a, sê	τύπτ-ε, σαι (afterwards τύπτ-εαι = τύπτ-ῃ).
	kship a, tê	τύπτ-ε, ται.
Dual.	kship-â, vahê	τυπτ-ό, μεθον
	kship-ê thê	τύπτ-ε, σθον.
	kship-êtê	τύπτ-ε, σθον.
Plural.	kship-â, mahê	τυπτ-ό, μεθα.
	kship-a, dhê	τύπτ-ε, σθε.
	kship-a, ntê	τύπτ-ο, νται.

That the passive signification should in course of time have taken the place of the middle, will not appear surprising, when it is recollected that a reflective verb is actually used in many languages, where a passive is used in others to express the same thing. An instance occurs in such a phrase as *les bas se vendent ici*, stockings sell themselves here; and in the same manner in Italian we have such phrases as *si dicono molte cose*, many thing say themselves, or are said; *si loda l'uomo modesto*, a modest man praises himself, that is, is praised; *mi si domanda uno scudo*, a dollar demands itself of me, that is, is demanded of me. The same idiom occurs both in Spanish and Portuguese.

It has been the practice to deny to the Latin language the possession of a middle, except in the case of deponent verbs. But in such a phrase as *Rhenus Oceano miscetur*, the verb is rather of the middle than the passive character, and this certainly must be allowed when it is said of a soldier *induitur galeam*, or when a general *milites armari jubet;* or as in the line of Virgil (*Georg.*, iii. 219)—

Pascitur in magna sylva formosa juvenca.

The above explanation of the middle form or voice is one which has been proposed; still the matter may require further discussion. The truth is, that the classification of verbs into active and passive, or into active, passive, and middle, is a very imperfect one, and for the purposes of a philosophical exhibition of grammar a new classification is wanting. The expressions 'I walk,' 'I eat,' &c., are in signification allied to the middle voice, though the form of these words does not differ from the form 'I kill,' 'I cut,' &c. In order to express the notion of the person 'I' being 'killed,' some modification of the primitive form 'kill' must be made, and another modification may be necessary to express the act of 'self-killing.' Thus in French we have *il tue*, *il fut tué*, and *il s'est tué*. In the last instance the act of 'self-killing' is distinguished from the act of 'being killed' by the addition of a word. In the Greek language the present tense of the passive form may be used to express either the act of the person being killed, or killing himself. In the first and second aorist tenses a peculiar form is used to express the act of self-killing; but as this peculiar form has the characteristic termination of what is called a passive verb, and not of an active, it might be classed under the passive voice as a peculiar tense, and the term middle voice might be got rid of altogether.

MIDDLESEX, the metropolitan county of England, is bounded on the north by Hertfordshire; on the east by Essex, from which it is separated by the river Lea; on the south-east by Kent, and on the south by Surrey, from both of which it is separated by the river Thames; and on the west by Buckinghamshire, from which it is separated by the river Colne. Its greatest length is, from north-east to south-west, from the Lea near Waltham Abbey to the Thames opposite Chertsey, 28 miles; its greatest breadth, at right angles to the length, is, from near South Mimms on the great north road to Limehouse, 17 miles. Its area is estimated at 282 square miles. The number of inhabitants in 1821 was 1,144,531; in 1831, 1,358,330; showing an increase in ten years of 213,799, or about 19 per cent., and giving 4817 inhabitants to a square mile. It is the smallest of all the English counties, except Rutland; in amount of population it is exceeded, and that only in a small degree, by Yorkshire alone; in density of population it very far

exceeds any other English county. The courts of civil and criminal jurisdiction are held in London or Westminster, or at Clerkenwell, in the suburbs of London; but for parliamentary purposes Brentford, seven miles from Hyde-park Corner on the great western road, is the county town.

Surface; Geological Character.—The surface of the county consists for the most part of gentle undulations, affording a sufficient slope for the purposes of drainage. A range of hills extends along the northern or Hertfordshire border by Barnet, Elstree, Stanmore, and Pinner, averaging 400 feet in height above the level of the Thames. Another range of hills skirts the northern side of the metropolis by Hornsey, Highgate, and Hampstead; Harrow occupies an insulated eminence between these two ranges. That portion of the county which lies south-west of a line drawn from Brentford to Uxbridge is an almost unbroken flat, scarcely rising more than from 10 to 20 feet above the level of the Thames.

The county is chiefly occupied by the London clay. Enfield Chace, the most northern portion, and a strip along the western boundary by Harefield and Uxbridge, are occupied by the plastic clay, which here crops out. The high ground about Hampstead, Highgate, and Hornsey consists of Bagshot sand, a marine formation of unascertained depth covering the London clay. The thickness of the London clay is very variable. At Bromley near the Lea, in the south-east corner of the county, it was found to be only 44 feet (covered with 18 feet of alluvium), while at White's Club-house, St. James's, London, it was 235 feet. The thickness of the plastic clay in this county appears to be from 100 to 120 feet.

The county belongs entirely to the basin of the Thames, which forms its southern boundary. The Thames first touches the border just above Staines, at the junction of one of the arms of the Colne, and flows about six or seven miles to the southernmost point of the county near Shepperton, where (on the Surrey side) it receives the Wey. From the junction of the Wey it flows in a circuitous channel eastward 8 miles to Thames Ditton, above Kingston, and from thence 9 miles in a winding channel northward to Kew Bridge, just below Brentford. From Kew Bridge the Thames flows eastward 20 miles, with many bends, to the junction of the Lea, just above which it makes a circuit, nearly encompassing a marshy peninsula at the south-eastern angle of the county, called the Isle of Dogs. This river is crossed by several bridges: at Staines and Chertsey (both of stone), Walton (brick and stone), Hampton Court (wood), Kingston, Richmond, and Kew (all of stone), Hammersmith (a suspension bridge), and Putney and Chelsea (wood). There are six bridges in the metropolis: Vauxhall (an iron bridge), Westminster, Waterloo, and Blackfriars (all of stone), Southwark (an iron bridge), and London, the lowest on the river, a stone bridge. Between Rotherhithe and Wapping, about a mile and a half below London Bridge, a tunnel is in progress under the bed of the river. It has a double-arched roadway, with footpaths. The entrance at each end is to be by an inclined plane for carriages and horses, and a flight of steps for foot passengers. The river is navigable throughout for laden barges; but locks are required in the upper part to keep up the water. The lowest of these locks is at Teddington, between Kingston and Richmond bridges. Up to London Bridge the Thames is navigable for sea-borne vessels, and the space between that bridge and the junction of the Lea forms the port of London. [LONDON.] The banks of the Thames are for the most part low and flat, and in some places marshy. The Isle of Dogs would be overflowed every tide, if it were not protected by embankments.

The Lea forms the eastern boundary of the county, which it touches below Waltham Abbey. Its waters are, at the point of junction, divided between two or three channels, which reunite very soon after. Its course is southward through a belt of low marsh-land, 8 miles to the foot of Stamford Hill. In this part there is a navigable cut, distinct from the natural bed of the river, extending from Stewardstone below Waltham Abbey to the neighbourhood of Tottenham. The natural channel is in several parts divided so as to insulate portions of the marsh. From Stamford Hill the Lea flows south-east 6 miles by Lea Bridge, Old Ford, Bow, and Bromley, into the Thames. Below Lea Bridge it is divided into several channels, which reunite a little above the outfal. In one part (namely, between Lea Bridge and Old Ford) the navigation is carried on by an artificial channel. A navigable cut opens a communication between the Lea at Bromley and the Thames at Limehouse, avoiding the tedious circumnavigation of the Isle of Dogs. There are several mills on those channels of the Lea which are not used for navigation.

The Colne forms the western boundary of the county. It first touches the border below Rickmansworth, and its waters, like those of the Lea, frequently flow in several channels, which enclose a number of islands. It flows southward past or near Uxbridge, West Drayton, Harmondsworth, and Colnbrook (Bucks), to its junction with the Thames above Staines. Its whole length on the border of this county is about 18 miles: it is not navigable, but is useful in turning a number of mills. Two channels from this river near Colnbrook communicate, one with the Thames at Hampton Court, the other with the Cran near the powder-mills at Hounslow; a third stream from a little above Staines flows into the Thames between Shepperton and Sunbury.

The Brent rises just within the northern border of the county, and, after crossing a corner of Hertfordshire north of Totteridge, flows by Finchley, Brent-street in Hendon, Kingsbury, Twyford, Hanwell, and Brentford, into the Thames. Its course, which is very circuitous, is about 18 or 20 miles: it is not navigable, except in some part of its lower course, where it forms part of the line of the Grand Junction Canal. The Cran rises between Harrow and Pinner, and after a very circuitous course of 19 or 20 miles past or near Ickenham, Cranford, and the powder-mills at Hounslow, joins the Thames at Isleworth.

The principal canal is the Grand Junction, which enters the county near Harefield, in the north-west corner, and runs southward along the valley of the Colne by Uxbridge to West Drayton: from this place it runs eastward across the Cran to the Brent near Hanwell: it then follows the valley of the Brent, and for the most part coincides with the channel of that river, till it joins the Thames near Brentford. About 18 miles of its course are in this county. A branch from this canal near Cranford runs north-east to Northolt, and from thence east-south-east by Twyford to Paddington, a distance of 12 or 14 miles. The main line and the Paddington branch have an average width of 43 feet, and a depth of 5 feet. There is only one lock between the wharf at Paddington and Uxbridge.

The Regent's Canal commences in the Paddington branch of the Grand Junction Canal, and passes along the north and east sides of the metropolis by the Regent's Park, Camden Town, Islington, Kingsland, Hackney, Mile End, and the Commercial Road, into the Thames near Limehouse. Its length is 8½ miles, with a fall of 90 feet: it has twelve locks exclusive of the tide-lock. It passes under Islington and the New River by a tunnel, and has one or two short branch cuts or basins in its course, one of which (Sir Geo. Duckett's canal) communicates with the Lea near Old Ford.

The New River, an artificial cut designed to supply the metropolis with water, enters the county on the north side between Enfield and Cheshunt, and is conveyed in a very winding channel to a reservoir at Pentonville, on the north side of London. [MIDDLETON, SIR HUGH.]

The south-western road (to Salisbury, Exeter, &c.) leaves London by Hyde-park Corner, and runs by Hammersmith, Brentford, Hounslow, and Bedfont, to Staines, where it crosses the Thames into Surrey. The Portsmouth road, branching from this near Hyde-park Corner, crosses the Thames at Putney Bridge; and the western (Bath and Bristol) road, branching from it at Hounslow, crosses the Colne at Colnbrook. The Oxford and Birmingham road leaves the metropolis at Tyburn turnpike, and passes through Shepherds' Bush, Acton, Hanwell, Southall, and Uxbridge, beyond which it crosses the Colne into Buckinghamshire. The great north road (to Derby, Leeds, Manchester, &c.) leaves London by Islington, and passes through Highgate, Fryern and Chipping Barnet, to South Mimms, where it branches off, one branch passing by St. Alban's, the other (the York road) passing by Hatfield. Another York road leaves London by Shoreditch church, and passes through Kingsland, Tottenham, Edmonton, and Enfield. Of the Norfolk and Suffolk roads, one leaves London by Shoreditch church, passing through Hackney, and crossing the Lea at Lea Bridge into Essex; another leaves by Whitechapel church, and crosses by Bow Bridge into Essex. These are the most important roads; but there are others well frequented. One (the Edgware road) leads from Tyburn turnpike by Paddington and Edgware into

Hertfordshire, joining the north road at St. Albans; another passes by Harrow and Pinner to Rickmansworth; and a third, called 'the Green Lanes,' leads by Stoke Newington and Winchmore Hill to Enfield.

The Birmingham Railway has its London terminus at Euston Grove, on the north side of the metropolis, and runs past Harrow to Watford in Hertfordshire; and the Great Western Railway has its London terminus at Paddington, and runs by Acton, Ealing, Hanwell, and Southall, to Maidenhead. The Eastern Counties Railroad commences at Mile End and runs by Bow and Stratford across the Lea into Essex: it is to communicate with Norwich and Yarmouth. There is another railway in progress, called the Northern and Eastern Railway, which also commences at Whitechapel, and is intended to communicate with Cambridge. Acts have been obtained for the Commercial Railway, to run from the eastern side of London to Blackwall; and for the Bristol, Birmingham, and Thames Junction Railway.

Agriculture.—The soil of this county is of three distinct qualities: poor sand and gravel on the tops of some of the hills and in various spots in the plain; a heavy poor clay in the north and north-west portion, which is chiefly covered with permanent grass, enriched by repeated application of manure; and a good fertile loam over a bed of gravel, and sometimes of peat, along the plain in which the Thames flows. To these must be added some rich deposits from the Thames, of a lighter and more muddy nature, which are admirably adapted for garden ground, and have been almost entirely converted into a rich black vegetable mould, by an abundant application of dung, from time immemorial.

The surface, with the exception of a few hills on the northern side of London, none of which rise more than 400 feet above the Thames, may be described as a plain, almost perfectly level as it approaches the Thames, but with a sufficient fall for the waters to prevent any of it being marshy. The Thames has been long kept within its present channel by artificial embankments, wherever these were necessary. But it is evident that, in times beyond memory, it frequently changed its bed, which accounts for the irregular deposition of gravel in various places, and the uniform covering of loam which is found above it.

Nearly the whole of the county lies over the blue clay, which is known by the name of the London clay: and the hills which rise above it are formed of a basis of clay covered by a poor ferruginous sand and gravel. In various places the clay appears near the surface at a level considerably above the loamy deposit mentioned above.

The stiff clay is altogether unfit for arable cultivation, until its nature is altered and corrected by the addition of chalk, lime, and ashes; most of it therefore remains undisturbed by the plough. When the commons, which are now mostly enclosed, remained open, the grass was poor and of little value; but that part which has been long enclosed has a coat of rich mould over it, caused by the annual application of dung to produce a sufficient crop of grass to make hay of, and its fertility is so much increased as to afford two good crops every year. Hay-making is nowhere better understood than in Middlesex. The value of hay so near the metropolis, and the abundant supply of labourers, enable the occupiers of grass-land to take advantage of a few days of fine weather to secure their hay. The mode of proceeding, as it is given in the Report of the Agriculture of Middlesex, by Middleton, has generally been held out as a pattern to all farmers. It is no doubt excellent where labourers are plentiful, but would be attended with some risk where the number is limited, and the extent of grass to be mown is considerable. The principle is, to expose the grass as much as possible to the sun and wind by keeping it constantly shaken up and moved, which is much facilitated by the use of the hay-making machine. It may thus be carried in a very few days, and stacked in a dry state; and when it is cut out, it appears of a fine green colour, not much changed by heating. The hay-ricks are generally large and neatly finished, the sides being pulled and trimmed smooth, and the top well thatched with straw. When the old hay is carried to market, it is tied up in neat trusses weighing 56 lbs. each, and 36 such trusses make a load. The trusses of new hay are made of 60 lbs. weight. It is called old when it has been in the rick three months. Some enclosures of pasture-land are made profitable by taking in horses to graze when they require rest and green food after having been overworked; but for this purpose the marsh pastures bordering on Essex along the Thames are preferred. There the soil is naturally rich, and requires little manure to recruit it.

The arable portion of the county lies chiefly towards Buckinghamshire, and between the Great Western Railway and the Thames. Some extremely good loams of considerable depth on a bed of flinty gravel, well adapted to every kind of agricultural produce, occur in several places. The lighter portions are mostly laid out in orchards, market-gardens, and nursery-grounds. Almost the whole of the land in the parishes of Chelsea, Hammersmith, Chiswick, Isleworth, and Brentford is taken up by such gardens. Here the spade is the principal instrument of cultivation. [GARDEN HUSBANDRY.]

Beyond Hounslow, including what was formerly Hounslow Heath, the land is cultivated more extensively, by farmers properly so called; and some of these occupy from 200 to 1500 acres. Here every improvement in the management of the soil is readily adopted; the best implements are in use: and it only requires a view of the fields along the two great branches of the western road to perceive that the land is kept clean and that the crops are good. The system is greatly modified by the short distance from an inexhaustible source of manure. It is not necessary to keep many head of cattle or great flocks of sheep to produce manure for the land. A smaller portion of the farm is devoted to raise food for cattle. Roots are disposed of to cowkeepers in London; but the expense of carriage is a great drawback to the profit. The produce is generally conveyed in waggons with four horses, or in tumbrils with two or three. A man and a boy are required in either case. Light single-horse carts, such as are used in Scotland, would be more economical, if one man could take charge of several carts, as is usually done there, and also in France; but the great traffic on the roads near London renders this very dangerous, and the law prohibits it. Every waggon with four horses, a man, and a boy, costs the proprietor from 1*l.* to 1*l.* 5*s.* for every working day. If half of this be placed to the account of the load taken to London, and the other half to that of the manure brought back, it will appear that, however convenient it may be to be able to procure manure at any time, and in any quantity, it is not so cheaply obtained as might appear at first sight. The number of horses required for a Middlesex farmer is much greater than where the land lies at a greater distance from any large town. The stable-dung is brought in a very fresh and loose state; it is put together in large heaps, where it heats very soon, and is then turned over, and sometimes covered with earth or sods. By the time it is carried upon the land it will have cost the farmer not much less than 1*l.* per waggon-load of three tons. Upon the lighter loams, which are improved by the treading of sheep, it is probably more advantageous to raise turnips, and fold the sheep on them, than to sell the turnips and buy town manure.

The course of crops on the farms in Middlesex is not so regular as in many other counties; but the alternation of white and green crops is very generally adopted. Naked fallows are almost entirely disused, even on the heavier soils. The land is kept clean by tares cut green, peas gathered in the pod, beans, and similar crops, which allow of ploughing and cleansing the land in summer, and sowing roots afterwards. The crops are usually drilled and well hoed: the principal are barley, clover, wheat, beans, oats—often in this order. Turnips and mangel-wurzel are not so extensively cultivated as they are where manure must be made on the farm. A succession of tares, to cut green for the horses, is indispensable; some of these are occasionally taken to London early in the season, and sell well in small quantities, tied up in bundles. Potatoes are not planted to so great an extent as might be supposed, considering the great consumption of this root in London: the reason is, that the market is fully supplied by cargoes which come by sea from Scotland, Yorkshire, Devonshire, and Jersey, where labour is cheaper and the land does not pay so high a rent. Potatoes consume much manure, whatever may have been pretended by some; and the corn which comes after them is generally weaker and less productive. When the rent of good land in Middlesex is taken into consideration, the carriage of manure, and the bulk of the crop to be carried to market by land, it will be found that, however valuable may be the produce of an acre of potatoes well cultivated, the expense is so great that the net return is little more than that of wheat, beans, or clover. It is very seldom that potatoes are planted as a substitute for the old fallow Beans or peas in wide rows, and carefully hoed, are much

preferable. Cole or rape is frequently sown on stiff loams, instead of turnips, and fed off with sheep. If the rape is drilled and hoed, it will clean the land, and forms an excellent preparation for wheat. It should have plenty of manure, which will be decomposed and well mixed with the soil when the wheat is sown. Thus the latter crop cannot fail to be good.

The grass-land is everywhere well managed. The surface is kept intersected with water-furrows wherever the soil is impervious to water, so that it never stagnates in winter. The grass is generally cut twice in the season, and made into hay; but the land is well manured, generally after the first mowing, about the middle of June. The Midsummer rains wash it in, and the aftermath is much increased by it. Two tons of hay at the first mowing, and one ton at the second, may be considered as the average produce of a statute acre. The rent of grass-land about ten miles from London, including rates and tithe, averages from 4*l.* to 6*l.* per acre. Nearer London grass-land lets very high for milch cows, and likewise for pleasure horses to graze in. But the rapid increase of buildings has converted so many fields into streets, or broken up the surface for the sake of the brick-earth, that the green meadows are every year farther from the centre of the metropolis.

Every breed of animal is to be met with in Middlesex. Horses and milch cows are the most common, as the most useful. The cart-horses are generally fine and strong. Some large horses, a little too heavy for a carriage and too slow for stage-coaches, but which make excellent cart-horses, are brought to London in large quantities by dealers, who collect them in the northern and midland counties. The dairy cows are chiefly of the large Holderness breed or the short-horn. Ayrshire cows have been tried, and, as far as milk goes, they are fully equal to the other breeds, taking the quantity of food consumed by each into consideration; but they do not yield such heavy carcasses to the butcher when fatted off. The most approved system of London dairymen is to let a cow be milked till she goes dry, and never allow her to go to the bull. By very high feeding she will increase in flesh while she gives milk, and by the time she is dry will be very fat. Private families in the neighbourhood of London, who have grass-land, have a predilection for the small Alderney cows, which give a small quantity of extremely rich milk. They are very quiet animals, and may be tethered or led about to graze in a halter. On good pasture they are very profitable. Alderney dairies have been established; but most of them have no title to that name, the large cows having soon superseded the smaller.

The price of labour in Middlesex is not so high, when compared with that of the adjoining counties, as might be expected. Very near London market-gardeners pay their labourers from 15*s.* to 1*l.* per week for day-labour; but as much as possible is done by the task. Digging and trenching are done by the square perch, the price varying according to the soil and the depth of the work. A good workman will earn 3*s.* 6*d.* or more in a day, but for this he must work hard. A mower has from 3*s.* to 6*s.* per acre for mowing grass, 2*s.* 6*d.* to 3*s.* 6*d.* for clover, and the same for oats or barley; tares and peas are hooked at from 3*s.* to 5*s.* per acre; wheat and rye are *fagged*, that is, cut close to the ground with a large reaping-hook, for 10*s.* to 18*s.* per acre, as the crop may be more or less heavy; beans for 6*s.* to 9*s.*; thrashing wheat costs 4*s.* to 5*s.* per quarter, and 1*s.* per load for tying up the straw; oats are thrashed for 2*s.* or 2*s.* 6*d.*; beans and pease, 1*s.* 6*d.* to 2*s.*; hay is cut, trussed, and every truss weighed, for 2*s.* 6*d.* to 3*s.* the load of thirty-six trusses; turnips hoed, first time, 6*s.* or 7*s.*; second time, 5*s.* Women making hay, and gathering peas or fruit, earn about 1*s.* per day.

These were the prices about thirty years ago; they had increased with the price of corn and meat, but have again fallen. At this moment they are rather on the increase; yet the above prices may be relied upon as fair averages in a circle of twenty-five miles round London. The principal weekly markets in Middlesex, out of London, are Barnet, every Monday; Southall and Finchley, on Wednesday; Uxbridge, Brentford, Hounslow, and Edgware, on Thursday; Staines, on Friday; and Enfield, on Saturday. Uxbridge is a great corn-market; Southall chiefly for cattle and sheep: those which remain unsold are sent to Smithfield on the Friday. Staines is also a good corn-market.

There are fairs at Brentford, May 17, 18, 19, and Sept. 12, 13, 14; Enfield, Sept. 23, Nov. 30; Hounslow, Trinity Monday, and Monday after Sept. 29; Staines, May 11; Uxbridge, July 31, Sept. 29, Oct. 19; Barnet fairs, April 8, and September 4, are noted for young cattle of every description.

Divisions, Towns, &c.—Middlesex is divided into six hundreds, as follows:—

	Acres.	Pop. in 1831.
Edmonton, N.E.	31,410	26,930
Gore, N.	28,660	11,315
Elthorne, N.W.	35,690	20,091
Isleworth, S.W.	9,280	13,568
Spelthorne, S.W.	23,500	15,212
Ossulston, S.E., including		
Finsbury division	11,934	151,409
Holborn „	7,808	316,255
Kensington „	19,220	87,961
Tower „	8,988	359,864
London city	600	123,683
Westminster city	2,500	201,842
Militia		200
	179,590	1,358,330

The cities of London and Westminster are locally in Ossulston hundred. The suburbs of London form the newly constituted parliamentary boroughs of Marylebone, Finsbury, and the Tower Hamlets.

There are four market-towns, Barnet, Brentford, Staines, and Uxbridge; besides Edgware, Enfield, and Hounslow, the markets of which have been discontinued; and a number of other places, which, though not ranking higher than villages, derive, from their proximity to the metropolis, sufficient interest and importance to require notice. [BARNET; BRENTFORD; CHELSEA; LONDON.]

Staines is in Spelthorne hundred, 16½ miles from Hyde-park Corner, on the road to Salisbury and Exeter. The parish contains an area of 1710 acres, with a population of 2486. The principal street extends half a mile along the road, and leads to the Thames. Many of the houses in the main street are good. A new stone bridge has been built over the river. The church is a neat modern structure, with a square embattled tower, and there are some dissenting places of worship. The market-house is a small building near the bridge. The market is on Friday, and there are two yearly fairs. There are several flour-mills near the town. The living is a vicarage united with the chapelries of Laleham and Ashford, of the joint annual value of 425*l.*, with a glebe-house. There were, in 1833, one infant-school, with 90 children; a school of industry for 26 girls, a Lancasterian school with 80 boys, and a national school with 40; one other day-school with 30 boys, three boarding-schools with 86 children, and three Sunday-schools, with 193 children of both sexes. There is also a Literary and Scientific Institution.

Uxbridge is in the parish of Hillingdon, in Elthorne hundred, about fifteen miles from Tyburn turnpike, on the Oxford road. It was formerly a place of strength, and a corporate town, and in the civil war of Charles I. was the scene of an unavailing negotiation for peace between the commissioners of the king and those of the parliament. The mansion in which the conferences were held is still standing. The area of Hillingdon parish is 4720 acres; the inhabitants, in 1831, amounted to 6885, of whom 3043 were in the chapelry of Uxbridge. The town consists of one principal street, about a mile in length, along the Oxford road, and two or three smaller ones. There are in the principal street two bridges over the arms of the river Colne, and one over the Grand Junction Canal. There are a commodious market-house of brick, supported on wooden columns; a chapel behind the market-house, built of flint and brick, and destitute of architectural beauty, capable of holding 800 persons; and several dissenting meeting-houses. The market, which is on Thursday, is one of the most important corn-markets in the kingdom. A second market, for provisions, is held on Saturday, and there are several yearly fairs. There are warehouses and wharfs on the Grand Junction Canal, and there are many flour-mills. Considerable business is done in the town, and brick-making is largely carried on in the neighbourhood.

The perpetual curacy of Uxbridge is of the clear yearly value of 111*l.*, with a glebe-house. There were, in 1833, a Lancasterian school, with 187 boys; a school of industry, with 107 girls; three other day-schools, with 114 children;

three boarding and day schools, with 87 children; and three Sunday-schools, with 515 children.

Edgware is in Gore hundred, 8 miles from Tyburn turnpike, on the road to Watford and Aylesbury. The parish has an area of 1990 acres, with a population, in 1831, of 591. The place has one long straggling street, but contains some respectable houses. The church is of brick, and was built about the middle of the last century; the tower, more antient, is of flint and stone. The market, which was formerly held on Thursday, has been discontinued for many years. The west side of the main street is in the parish of Stanmore Parva, or Whitchurch. Near this place is Canons, a neat villa, erected on the site and from the materials of a stately mansion built by the duke of Chandos, whose tasteless vanity, as displayed in this establishment, was bitterly satirised by Pope in his 'Moral Essays' (Ep. iv). The church of Stanmore Parva, close to the park of Canons, was decorated by the duke. Little Stanmore has an area of 1420 acres, with a population, in 1831, of 876. The living of Edgware is a vicarage, of the clear yearly value of 493*l.*, with a glebe-house; that of Stanmore Parva is a perpetual curacy, of the clear yearly value of 267*l.*, with a glebe-house. The two parishes had, in 1833, one infant or dame school, with 41 children; eight day-schools (one endowed), with 152 children; and two Sunday-schools, with 91 children.

Enfield is in Edmonton hundred; that part which is called Enfield Highway is 9½ miles from Shoreditch Church, on the York and Edinburgh road. Enfield manor-house was the residence of Elizabeth (afterwards queen) for a short time, during the reign of her brother Edward VI.; and she resided at Enfield, at the manor-house or at Elsynge-hall, at several periods during her reign. Of the manor-house one room on the ground-floor remains as in the queen's time. Elsynge-hall has disappeared, and its exact site is not known. The parish of Enfield has an area of 12,460 acres, with a population, in 1831, of 8812, about one-third agricultural. The houses constitute two principal groups; and many of them are well built. The church is an antient structure, comprehending chancel, nave, and two aisles, with a low embattled tower. There are a chapel-of-ease, lately erected, and several dissenting places of worship. Edward I. granted a charter for a market on Monday, and James I. for one on Saturday; but they have long fallen into disuse. There are two yearly fairs. There are in the parish a royal manufactory for fire-arms (partly carried on here and partly at Waltham Abbey), a manufactory for finishing crape, and two or three other trading establishments. The Lea navigation and the New River pass by or through this parish. Petty sessions and a Court of Requests are held here. The living of Enfield is a vicarage, of the clear yearly value of 1174*l.*, with a glebe-house. There were in the parish, in 1833, two infant schools, with 145 children; a school of industry, with 45 girls; seven other day-schools, with 181 children; five boarding and day schools, with 152 children; and four Sunday-schools, with 635 children.

Enfield Chase, formerly a large chase or park north-west of the town, extending into several parishes, is now entirely enclosed.

Hounslow is in the two parishes of Isleworth and Heston, in Isleworth hundred, but chiefly in Heston. The area of the two parishes is 6840 acres; the population, in 1831, was 8997. The town, which is 10 miles from Hyde-park Corner, is at the point where the Bath and Bristol road branches off from that to Exeter and Salisbury, and consists of a long street on the Exeter road, irregularly paved, and lighted with gas. Hounslow had an antient priory of the order of the Holy Trinity, which at its suppression, A.D. 1530, had a revenue of 80*l.* 15*s.* gross, or 74*l.* 8*s.* clear. The conventual chapel, long used as a chapel-of-ease, was taken down a few years since, and has been replaced by a new church, capable of seating above 1000 persons. The market, formerly held on Thursday, has been discontinued for some years. The chief business of the town has of late years arisen from its situation on a great thoroughfare, but this business is nearly destroyed since the opening of the Great Western Railway. There are some powder-mills and a flax-dressing-mill near the town. Adjoining to the town, on the west, was formerly an extensive heath, notorious for highway robberies. On this heath the army of James II. encamped before the Revolution. There are large cavalry barracks and an exercise-ground on what was formerly the heath. The remainder is now enclosed. The living of Hounslow is a perpetual curacy, of the clear yearly value of 125*l.* There were in Heston parish, in 1833, two infant schools, with about 321 children; three day-schools, with about 108 children; one boarding-school, with 19 boys; and one Sunday-school, with 70 children.

Tottenham is in Edmonton hundred, about 4 miles from Shoreditch church, on the York road. The parish, which is divided into four wards, has an area of 4680 acres, with a population, in 1831, of 6937. The main street is formed of good houses irregularly ranged along the road. In this street is a brick cross, erected A.D. 1600, in place of a former wooden one. The church is on a small eminence a short distance west of the village, and is an antient building, with a square embattled tower covered with ivy. The font is of great antiquity, and there are many monuments. A new church of considerable size has been built on Tottenham Green, and there are several dissenting meeting-houses. Bruce Castle (now occupied as a school) is a brick mansion, rebuilt in the latter part of the seventeenth century. A detached brick tower, which covers a deep well, is the only remain of the previous edifice, which was built by the Comptons early in the sixteenth century. The edifice takes its name from a castellated mansion, the residence of Robert Bruce the elder, father of the king of Scotland of that name, which antiently occupied the site. The river Lea forms the eastern boundary of the parish. There are extensive flour and oil mills. The living of Tottenham is a vicarage, of the clear yearly value of 978*l.*, with a glebe-house. The chapelry attached to the new church is of the clear yearly value of 309*l.*, and is in the gift of the vicar. There were, in 1833, two infant schools, with 85 children; an endowed free grammar-school with 80 boys; a 'blue-coat' school, with 60 girls, and a 'green-coat' school, with 40; two Lancasterian schools, with 283 children; a Catholic school, with 65 children; and several private day and boarding schools. There were also four Sunday-schools, with about 450 or 460 children.

Edmonton is on the York road, 7 miles from Shoreditch church, between Tottenham and Enfield. The parish has an area of 7480 acres, and is divided into four wards or 'streets,' beside an allotment of Enfield Chase assigned to this parish. The population, in 1831, was 8192. The village of Edmonton consists of two principal groups of houses, called Fore Street, or Upper Edmonton, and Church Street, or Lower Edmonton, extending along the north road for more than a mile, and consisting of some respectable ranges of houses, with detached mansions and villas. Southgate, a detached village west of Edmonton, is in 'South Street,' one of the four wards, and contains many residences of a superior description: among them is Minchenden House, belonging to the duke of Buckingham.

The parish church is for the most part of modern date, but the tower and some other portions are of greater antiquity; there are some antient monuments. There are chapels at Southgate and on Winchmore Hill, and several dissenting places of worship. The living of Edmonton is a vicarage, of the clear yearly value of 1550*l.*, with a glebe-house. The chapelries of Southgate and St. Paul, Winchmore Hill, are of the clear yearly value of 180*l.* and 100*l.* respectively, and are in the gift of the vicar of Edmonton. There were in the parish, in 1833, an endowed day-school, with 106 children, 60 of whom were clothed; another endowed day-school, with 72 girls; three day-schools, partly or wholly supported by charitable contributions, containing 233 children; eight other day-schools, with 117 children; ten boarding-schools, with 460 children; two day and Sunday schools, with 253 children; and one Sunday-school, with 184 children. Wyer House, in the parish of Edmonton, about a mile north-west of the village, is a fine old mansion-house built in the early part of the seventeenth century.

Harrow-on-the-Hill is in Gore hundred, 10 miles from Tyburn turnpike, on the road to Rickmansworth. The parish (including the hamlet of Harrow Weald and Green Hill) has an area of 9870 acres, with a population, in 1831, of 3861. The village is irregularly laid out. It derives its celebrity and chief support from its grammar-school, which was founded, under letters-patent of queen Elizabeth, by John Lyon, a wealthy yeoman of this parish, A.D. 1571. There are considerable estates which were left by J. Lyon for the support of the school and other charitable purposes. The school contained, in 1833, about 250 scholars:

it is free to all boys of the parish of Harrow, but there are very few who take advantage of this opportunity; the scholars are chiefly the sons of the nobility and gentry. Many eminent men have been educated at Harrow: as Bruce, the Abyssinian traveller, Sir William Jones, Richard Brinsley Sheridan, the late Lord Byron, Dr. Parr, and many others. The parish church is a spacious structure on the summit of the hill: there are some small portions in the Norman style; and at the west end is a lofty tower, with a spire. The grammar-school is near the church. There are some dissenting meeting-houses; there are two chapels-of-ease, one at Pinner (which is considered as a distinct parish), and the other at Harrow Weald, a group of houses about two miles north of the village. The living of Harrow is a vicarage, of the clear yearly value of 627*l.*, with a glebe-house. The vicar has the right of presentation to the perpetual curacy of Pinner, which is ecclesiastically dependent on Harrow, and is of the yearly value of 100*l.* Harrow and Pinner are in the peculiar jurisdiction of the archbishop of Canterbury. There were in the parish, in 1833, three infant or dame schools, with 93 children; four day-schools, supported by subscription, with 197 children; two boarding-schools, with 76 children; and four Sunday-schools, with 409 children.

Twickenham is in Isleworth hundred, on the bank of the Thames, 10 miles from Hyde-park Corner. It has derived celebrity from its being the residence of Alexander Pope and several other eminent persons. The parish has an area of 2440 acres, with a population in 1831 of 4571. The village is irregularly laid out, but contains a number of genteel residences. The church is near the river, and is a plain brick structure, built in the early part of the last century, with an antient embattled tower. It contains monuments erected by Pope to the memory of his parents, and by bishop Warburton to Pope himself. There is a chapel-of-ease, erected A.D. 1720 or 1721, between Twickenham and Richmond, and one or two dissenting meeting-houses. Among the private residences are Strawberry Hill, and the house of Sir Wathen Waller, popularly termed 'Pope's Villa,' because it occupies the site of the poet's residence. Strawberry Hill was in great part erected by Horace Walpole, lord Orford, and is a medley of castellated and ecclesiastical Gothic architecture. There are powder and oil mills. The village is much frequented by visitors from London. The steam-boats which ply between London and Richmond frequently proceed up to 'Twickenham ait,' a small island in the river Thames, comprising a few acres chiefly laid out in pleasure-grounds. There is much garden-ground in the parish, the produce of which is sent up to the London market. The living is a vicarage of the clear yearly value of 717*l.*, with a glebe-house. There were in the parish, in 1833, an infant or dame school of 20 children; an endowed day-school with 166 children; three day-schools, partly supported by charitable contributions, containing 104 children; five other day-schools, with 154 children; and five boarding-schools, with 110 children.

Isleworth, adjoining Twickenham on the north side, is in Isleworth hundred, 8¼ miles from Hyde-park Corner. The parish has an area of 3120 acres, with a population of 5590. At Sion or Syon, in this parish, was formerly a monastery of Bridgetine priests and nuns, founded A.D. 1414 by Henry V., and originally settled at Twickenham. The yearly revenues of this house at the dissolution were 1944*l.* 11*s.* 8*d.* gross, or 1731*l.* 8*s.* 4*d.* clear. In the walls of this monastery after its desecration, Catherine Howard, queen of Henry VIII., was confined shortly before her execution. The site was granted by Edward VI. to the Protector Somerset, who commenced the present mansion of Sion House, which has received great additions and alterations from the dukes of Northumberland, the subsequent proprietors. This noble residence contains some valuable portraits. The village of Isleworth is on the bank of the Thames opposite to Kew Gardens, and consists of several substantial villas and residences, with others of less pretension. The church, on the bank of the Thames, is of brick, and was rebuilt A.D. 1705 or 1706; the tower, more antient, is of stone. There are some dissenting places of worship. The chief business of the parish is gardening; great quantities of raspberries and strawberries are grown for the London market. There are two flour-mills and a brewery. There are three ranges of almshouses in the parish. The living is a vicarage of the clear yearly value of 681*l.*, with a glebe-house. There were, in 1833, one infant-school, with from 50 to 70 children; an endowed school, with 150 children; a day and Sunday school, with 30 girls; and a Sunday-school, with 126 children; besides a large day-school in Hounslow (which is partly in this parish), supported partly by subscription.

Hampton is in Spelthorne hundred, about 15 miles from Hyde-park Corner. The parish, including the hamlet of Hampton Wick, has an area of 3190 acres, with a population in 1831 of 3992, of whom 1463 were in Hampton Wick. In this parish is the royal palace of Hampton Court, the site of which was once the possession of the Knights Hospitallers. On the suppression of the Order the fee of the manor was retained by the crown. Cardinal Wolsey took a lease of the manor from the prior of St. John's before the dissolution, which lease he surrendered to the king Henry VIII., who formed a royal park or chace, comprehending Hampton and several other parishes, which he enclosed and stocked with deer. This chace was in the succeeding reign broken up on the remonstrance of the aggrieved parishes, but the crown has since retained paramount authority over all game within its limits. While Wolsey held the lease of the manor he pulled down a mansion which stood here, and erected in its place a sumptuous palace, which Henry VIII. subsequently enlarged. Here Edward VI. was born, and his mother queen Jane Seymour died. This palace was the scene of the celebrated conference of 1603-4 between the Presbyterian clergy and the bishops and other Episcopal clergy, at which the king James I. was moderator, and the lords of the council were auditors. Charles I. resided here during part of his confinement, and Cromwell, Charles II., and James II. made it their occasional residence. William III. rebuilt a considerable part of the palace, and laid out the gardens and park in their present form. Since the time of George II. it has not been the abode of royalty, and is now occupied by private families who have grants of residence from the lord-chamberlain. The number of residents, including servants, is stated to be 700. The palace consists of three principal quadrangles, with some smaller courts. The chapel, the great hall, and some of the subordinate chambers and domestic offices are part of the building erected by Wolsey and enlarged by Henry VIII. The great eastern and southern fronts are the most modern parts of the building; the eastern front has an extent of about 330 feet, the southern of 328 feet. These portions were erected by Sir Christopher Wren, but are neither in keeping with the more antient portions of the structure, nor distinguished by any great beauty. The palace contains a number of pictures by the old masters, but the Cartoons of Raffaelle constitute its chief treasure. The gardens are laid out in very formal taste. The park has several avenues and fine clumps of trees. Bushey Park and lodge are an appendage of Hampton Court Palace; the lodge was the residence of William IV. when duke of Clarence, and now belongs to the queen-dowager for her life.

The village of Hampton has some substantial houses and handsome villas; among the latter is that which belonged to Garrick. Hampton races are held on Moulsey Hurst, on the opposite side of the Thames. The living of Hampton is a vicarage of the clear yearly value of 356*l.*, with a glebe-house. Hampton Wick is a chapelry of the clear yearly value of 87*l.*, in the gift of the vicar of Hampton. There were, in 1833, in the whole parish, nine day-schools (one endowed and one school of industry), with about 350 children: seven boarding-schools, with 94 children; and three Sunday-schools, with 76 children.

Hammersmith is in Kensington division of Ossulston hundred, 4 miles from Hyde-park Corner. The chapelry of Hammersmith, a dependency of Fulham parish, has an area of 2140 acres, with a population, in 1831, of 10,222. The principal street extends nearly two miles along the western road, and consists of several ranges of good modern houses. An elegant suspension-bridge crosses the Thames at this place. There are two churches: one erected in 1631, a spacious brick building; the other a Doric edifice, built within the last few years. The Dissenters have several places of worship, and the Catholics have a chapel and a convent of Benedictine nuns. Brandenburgh House, a villa erected by Sir Nicholas Crispe in the seventeenth century, and improved by subsequent occupants, was the residence of the late queen Caroline during her last abode in England. She died here, and after her death the house was pulled down. There are large nursery-grounds in the parish, and brick-making is extensively carried on. The living of Ham-

mersmith is of the clear yearly value of 310*l*. There were in the chapelry, in 1833, an endowed school called 'Latymer's school,' with 80 boys; a charity school for 50 girls, a school of industry with 57 girls, three other charity schools (one of them supported by Catholics), with 90 children; twenty-nine other day-schools, with 532 children; eighteen boarding-schools, with 466 children; and eight Sunday-schools, with 572 children.

Fulham, 4 miles from Hyde-park Corner, is in the same hundred and division as Hammersmith. The parish, exclusive of the chapelry of Hammersmith, has an area of 1820 acres, with a population, in 1831, of 7317. It was the scene of some military movements in the war between Charles I. and the parliament, A.D. 1642; and in 1647 the council of officers and agitators sat at Fulham and Putney (a village in Surrey on the opposite bank of the Thames), to overawe the parliament and watch the king, who was then in confinement at Hampton Court. The village contains many good houses and villas; the manor-house is the residence of the bishop of London. The church is of stone, and has a stone tower in the decorated English style. There is a proprietary chapel, built by Richard Hunt, Esq., A.D. 1813, between Fulham and Hammersmith.

The bridge over the Thames at this place is of wood. There are extensive market-gardens in the parish, which are noted for the growth of asparagus. The living is a vicarage of the clear yearly value of 1135*l*., in the gift of the bishop of London. There were in the parish, in 1833, two infant schools, with 159 children; two national schools, with 249 children; three charity-schools, with 72 children; eleven other day-schools, with 213 children; ten boarding-schools, with about 207 children; and one Sunday-school with 60 to 80 children.

Kensington, in the same division and hundred as the preceding parishes, is now a suburb of London. The parish, with the extra-parochial chapelry of Twyford, has an area of 2980 acres, with a population, in 1831, of 20,945. Part of the chapelry of Knightsbridge is in Kensington parish. The principal street of Kensington consists of ranges of well-built houses extending along the great western road; and there are other streets. Brompton and Little Chelsea, on the south, and Kensington gravel-pits, on the north, are in the parish. There is at Kensington a royal palace, built on the site of a residence belonging to the family of Finch, earls of Winchelsea and Nottingham, from whom it was purchased by William III. That prince converted the dwelling-house into a palace, rebuilding the principal parts, and making many additions to it, which succeeding princes have augmented. The palace is of red brick, ornamented with columns and coignes of stone, and consists of three principal quadrangles. The suites of apartments are noble and extensive, and are adorned with many fine paintings by Flemish and English artists. The gardens and grounds, which are agreeably laid out, are three miles in circuit. There are barracks for detachments of the guards. Several members of the Royal family have apartments within the palace. Holland House, an antient mansion, chiefly in the Elizabethan style, was the residence of Addison, who died here; and much of the early life of Charles James Fox was passed here. It is now the residence of Lord Holland: it contains some interesting portraits. Campden House is another antient residence in the same style. Kensington Church, a large modern brick building, is near the principal street: new churches have been erected in Addison Road and at Brompton, and there is a chapel-of-ease at Brompton, erected about seventy years ago. There are dissenting and Catholic chapels. The living is a vicarage, of the clear yearly value of 1242*l*., with a glebe-house. To the new churches in Addison Road (St. Barnabas) and Brompton (Trinity Church) are annexed curacies, of the respective value of 405*l*. and 639*l*., in the gift of the vicar of Kensington. There were, in 1833, five infant or dame schools, with 44 children; a national school, with 290 children; a school for 17 girls, supported out of the parish rates; two schools, partly or wholly supported by charitable contributions, with 104 children; twenty-three other day-schools, with 489 children; forty-nine boarding-schools, with 827 children; and three Sunday-schools, with 265 children. There were also two proprietary grammar-schools, with about 180 children.

The parishes of St. Marylebone (pop., in 1831, 122,206), St. Pancras (pop. 103,548), and Paddington (14,540), in the Holborn division of Ossulston hundred, constitute the parliamentary borough of Marylebone. They are for the most part united to London. [LONDON.] The hamlets of Camden Town and Kentish Town, and part of the village of Highgate, are in St. Pancras parish. Camden Town consists of some streets of good houses; and Kentish Town of some rows of houses and detached villas. Camden Town is now rapidly increasing, and has greatly improved of late years, especially since the completion of the London and Birmingham Railroad. There is an Episcopal chapel at Camden Town, and one in Kentish Town, beside several dissenting meeting-houses. There is a veterinary college at Camden Town. The Regent's Canal passes between these two hamlets.

Hampstead is on high ground, 4 miles from Holborn Bars, in Holborn division of Ossulston hundred. The parish, which contains 2070 acres, with a population, in 1831, of 8588, was separated from that of Hendon in 1598. It contains the village of Hampstead and the hamlet of Kilburn. The village of Hampstead contains mineral springs, once in considerable repute. The salubrity of the air, and the pleasantness of the prospect which, from its elevated situation, it enjoys, have made it a favourite place of residence: on the hill, north-east of the village, is an extensive heath, on which are some large ponds, or reservoirs of water, used for supplying Camden Town and the adjacent parts with water. The church, which is of brick, was built about the middle of the last century. There are two proprietary Episcopal chapels, and several dissenting places of worship. The living is a perpetual curacy, of the clear yearly value of 887*l*. There were, in 1833, two infant-schools, with 159 children; three charity-schools (two attached to the Established Church, and one supported by Roman Catholics), with 287 children; nine other day-schools, with 155 children; seventeen boarding-schools, with 384 children; one day and Sunday school (at Kilburn), with 85 children; and five Sunday-schools, with 585 children.

Islington, one mile north of Hicks's Hall, on the great north road, is in the Finsbury division of Ossulston hundred, and included in the metropolitan parliamentary borough of Finsbury. The parish has an area of 3050 acres, with a population, in 1831, of 37,316. The principal street, under the designations of High Street, Upper Street, and Holloway, runs for several miles along the north road to the foot of Highgate Hill. Lower Street branches off from High Street, and runs towards Newington Green and Stoke Newington. The Liverpool Road forms a back road to Holloway: the new north road, and the new road from King's Cross to Holloway, have been laid out within the last twenty years. Highbury, Canonbury, Ball's Pond, and Holloway, are portions of the village, which comprehends a number of ranges of good houses. The New River passes through the parish, and the Regent's Canal is carried by a tunnel under the High Street, which is on an eminence, and under the New River. A considerable part of the parish is occupied as pasture-land by cow-keepers, who supply the metropolis with milk. There are some nursery grounds, and one or two manufactories, together with lime and coal wharfs, in the part adjacent to the Regent's Canal. The church is situated between Upper and Lower streets, and is of brick, with a tower of the same materials, surmounted by a stone spire of good design. There is a chapel-of-ease at Lower Holloway, a plain and rather heavy brick building, built A.D. 1814; and there are district churches at Upper Holloway (St. John's, a neat building, with a square embattled tower, crowned with pinnacles), Ball's Pond (St. Paul's, a structure of similar character to St. John's), in Cloudesley Square, near the back road (Trinity Church), and St. Peter's, the last erected. There are also several dissenting places of worship. At Islington is a college, belonging to the Church Missionary Society, for the education of young men designed for foreign missions; and at Highbury an academy for the education of young men for the ministry among the Independents. The Caledonian Asylum is a handsome building, on the road leading from King's Cross, St. Pancras, to Holloway. Canonbury Tower, a heavy square brick building, is a relic of Canonbury House, the former mansion of the priors of St. Bartholomew's Monastery in Smithfield, and has been the residence of Dr. Goldsmith, Chambers, author of the Cyclopædia, and other persons of literary note. The living of Islington is a vicarage, of the clear yearly value of 1155*l*., the perpetual curacies are of the following clear yearly

value:—Lower Holloway Chapel, 351*l.*; St. John's, Upper Holloway, 250*l.*; St. Paul's, Ball's Bond, 335*l.*; and Trinity, Cloudesley Square, 485*l.* Of the chapelry of St. Peter's there is no return. There were, in 1833, four infant-schools, with 578 children; thirty-eight boarding-schools, and sixty-one day-schools, among which were included three national schools, with 204 children; three other charity schools, connected with the Established Church, with 582 children; a Lancasterian school, with 160 girls; a school of industry for 35 girls, and three other charity schools, with 260 children. There are a proprietary school for 160 boys, and nine Sunday-schools, with 1648 children. In the British Orphan Asylum 43 children are maintained and educated, and in the Caledonian Asylum about 100. There is a Literary and Scientific Institution.

Hornsey is in the same hundred and division, north of Islington. The area of the parish is 2960 acres; the population, in 1831, was 4856. It contains the village of Hornsey, and the hamlets of Crouch End, Muswell Hill, and Stroud Green. Few villages near London have retained a more rural character than Hornsey. It lies in a valley out of the great thoroughfares; the New River passes close to it. The church, which is of stone, has been recently restored or rebuilt all but the tower, which is more antient. There were, in 1833, two national schools at Hornsey, with 115 children. The living is a rectory, of the clear yearly value of 493*l.*, with a glebe-house.

Highgate is on high ground on the great north road, 4 miles from London. Part of the village is in the parish of St. Pancras, and part in Hornsey parish. The village, which comprises some good villas and other houses, is on the top of a hill. A new church has been lately built, and a new school-room for the endowed grammar-school, which was founded by Chief-Justice Cholmeley in the reign of Queen Elizabeth. The master has a good salary and a house. There are some almshouses at Highgate, and one or two dissenting places of worship. Some ponds at Highgate contribute to supply part of the northern suburbs of the metropolis with water.

In order to avoid the steep declivity at Highgate, a project was formed in 1809 for carrying the north road through a spacious arched tunnel. The work was commenced; but in 1812 the earth over the tunnel fell in, the plan of a tunnel was given up, and a road was cut through the hill. A road which crosses the north road is carried over it by means of an archway of brick and stone. An extensive cemetery has lately been formed at Highgate, on the slope of the hill just below the church: the grounds are well laid out, and the entrance gateway contains a chapel and other apartments. There are numerous catacombs in this cemetery. There were in Cholmeley's grammar-school, in 1833, 33 boys; in another endowed school were 26 girls; and in a national school, 98 boys. A room for a national school for 100 girls was building at the same time.

Hackney is 2 miles from Shoreditch church, on one of the branches of the Norfolk and Suffolk roads. The parish has an area of 3300 acres, with a population, in 1831, of 31,047. It contains the several villages or hamlets of Hackney, Homerton, Upper and Lower Clapton, Stamford Hill, Dalston, Shacklewell, the greater part of Kingsland, and a part of Stoke Newington. Hackney, properly so called, has one principal street, known as Mare Street and Church Street, and some other streets, containing many good houses, some of them of old date, for this was one of the earliest places of rural retirement to the wealthy merchants and traders of London. The church was rebuilt near the close of the last century; it is a large brick building devoid of external beauty, but its interior construction and arrangements have been the subject of much commendation. It has a stone tower of modern erection, but as this was insufficient to bear the bells, the tower of the former church has been allowed to remain in the churchyard, which is spacious and pleasantly laid out. South Hackney church, originally built as a chapel-of-ease, but since made a district church, has little architectural beauty. Homerton adjoins Hackney on the north-east, and consists of one street, half a mile long, leading down to the marshes of the Lea. It has a proprietary Episcopal chapel, and a college rebuilt a few years since for the education of Congregational ministers. Clapton lies north of Homerton, and Stamford Hill north of Clapton. There are at Clapton a neat iron bridge, called Lea Bridge, over the Lea, and a handsome building erected for the London Orphan Asylum. At Stamford Hill is an Episcopal chapel, originally a proprietary chapel, but since purchased by subscription of the inhabitants and enlarged. Those parts of Kingsland and Newington which are in this parish are on the York road. On this road is the district church of West Hackney, a Doric edifice of good design. It has a large churchyard and a parsonage house. There is a small antient chapel at Kingsland, partly in this parish, partly in Islington. Dalston and Shacklewell lie between Hackney proper, Kingsland, and Newington. There are several dissenting meeting-houses; and several ranges of almshouses in the parish; among the latter is 'the Retreat' for the Widows of twelve Independent or Baptist Ministers. Dyeing, calico printing, and some other manufacturing processes are carried on in the parish; and there are considerable brick fields. The Regent's Canal and the Lea navigation pass through the parish.

Hackney parish originally constituted one benefice; but it has lately been divided into four districts, which, with the clear yearly value of their benefices, are as follows:—Hackney Rectory (the mother church), 1082*l.*, with a glebe-house; South Hackney Rectory, 399*l.*; West Hackney Rectory, 464*l*, with a glebe-house; Stamford Hill Chapelry, 165*l.* There were in the parish, in 1833, sixty-three day and boarding schools of all kinds, four day and Sunday schools, and ten Sunday-schools. Of these schools four were infant schools, supported chiefly by endowment or subscription, with 470 to 490 children; fifteen others were charity schools, including two national and two Lancasterian schools, the Cumberland Benevolent Institution, the London Orphan Asylum, and the boys' establishment of the Children's Friend Society, which is at Hackney Wick. There are two proprietary grammar-schools; one connected with the Church of England, the other open to all sects. The school-house of the former is a brick building at Clapton, with a Doric front and portico finished with cement in imitation of stone; that of the latter is near Hackney churchyard, and is of Gothic architecture.

Bow is on the other and main branch of the Norfolk and Suffolk roads, 2½ miles from Whitechapel church. The name of the parish is Stratford-le-Bow, but we have given the colloquial abbreviation in order to distinguish it from Stratford Langthorn, or colloquially Stratford, which is just across the Lea in Essex. Between Bow and Stratford is an antient bridge over the Lea. Bow church is an antient structure, chiefly in the early English style, but there are some portions of Norman architecture. A yearly fair, much resorted to by the Londoners, has been of late years suppressed. The parish, which has an area of 630 acres, with a population, in 1831, of 3371, was separated from that of Stepney in 1730. At the hamlet of Oldford, in the parish, are the East London waterworks. The living is a rectory, of the clear yearly value of 319*l.*, with a glebe-house. There were, in 1833, three dame-schools, with 48 children; three boarding-schools, with 88 children; five day-schools, two of them endowed, with 109 children, and three unendowed, with 42 children; and two Sunday-schools, with 244 children.

Bromley is adjacent to Bow. Distilling and calico printing are carried on, and many of the inhabitants are much engaged in the East and West India Docks, and in the adjacent dockyards in Limehouse and Stepney parishes. The church has some traces of Norman architecture: it was probably the chapel of a Benedictine nunnery once existing here, whose revenue at the suppression was 121*l.* 16*s.* 0*d.* gross, or 108*l.* 1*s.* 11*d.* clear. The parish has an area of 620 acres, with a population, in 1831, of 4846. The living of Bromley is a donative, of the clear yearly value of 190*l.* The parish had, in 1833, one infant school, with 20 children; an endowed day-school, with 17 boys; two national schools, with 195 children; one other day-school, with 12 children; and one Sunday-school, with 180 children.

Stepney and Limehouse are immediately adjacent to London on the east side. The parish of Stepney comprehends an area of 2130 acres, and is divided into the four hamlets of Mile-End Old Town, Mile-End New Town, Poplar Chapel (with Blackwall), and Ratcliffe, having a population in all of 67,872. Limehouse parish is immediately adjacent to Stepney, and comprises 280 acres, with a population of 15,695. These two parishes comprehend the Isle of Dogs, and the adjacent districts extending northward to the road to Bow, on which road the hamlets of Mile-End are situated. Along this road, and along the Commercial Road, extending from London to Limehouse, as well as in the immediate

streets and squares, are several ranges of good houses. Stepney church is a spacious building of stone and flint, probably erected in the 14th century. A new church was erected in the parish in the year 1822. There is at Stepney a college or academy for the education of ministers among the Calvinistic or Particular Baptists. Along the Mile-End Road are several hospitals or almshouses; of which the principal are the Jews' hospital, Bancroft's almshouses, and those belonging to the Trinity House. Limehouse church is one of the fifty erected in the reign of Queen Anne. Poplar chapel is a neat structure, almost entirely rebuilt in the latter part of the last century. The East India Hospital, in connection with this chapel, contains a dwelling for a chaplain, and for the widows of officers and seamen in the Company's service.

These two parishes are chiefly inhabited by seafaring people, or by those engaged in the building or fitting out of vessels. They contain the East India Docks and the West India Docks, and the basin at the junction of the Regent's Canal with the Thames. There are ship-building yards and ropewalks, also manufactories for anchors and chain cables, sail-cloth, ships' blocks, &c. The Regent's Canal and a cut from the river Lea to the Thames cross this parish. A tramroad leads along the south side of the Commercial Road from the West India Docks to Whitechapel: and a railroad is to run from London to Blackwall.

The living of Stepney is a rectory, of the clear yearly value of 1190*l.*, with a glebe-house. There is a chapelry attached to the new church, of the clear yearly value of 218*l.* Poplar is a rectory, of the clear yearly value of 632*l.*, with a glebe-house. Limehouse is a rectory, of the clear yearly value of 714*l.*

The parish of Stepney was once much more extensive than at present: those of St. Paul, Shadwell; St. Mary, Whitechapel; St. John, Wapping; St. Mary, Stratford-le-Bow; Christchurch, Spitalfields; St. George's in the East; St. Ann's, Limehouse; and St. Matthew, Bethnal Green, have been formed by separation from it. Had the parish retained its former extent, the population in 1831 would have been 250,000.

Stepney and Limehouse parishes contained, in 1833, three infant schools, seventy-three day-schools, and sixteen Sunday-schools. Of the day-schools, the principal are, Bancroft's school, in which 100 boys are boarded, clothed, and instructed; the Jew's hospital, for the employment and education of youth, with 58 children; Stepney proprietary school, with 120 boys; an endowed free-school under the management of the Cooper's company, with 35 boys; and several national or other charity schools. There are several dissenting congregations.

The parishes described above, from Hackney inclusive, are in the Tower division of Ossulston hundred, which is comprehended in the new metropolitan parliamentary borough of the Tower Hamlets.

Divisions for Ecclesiastical and Legal Purposes.—This county is included in the diocese of London, and is divided between the archdeacons of London and Middlesex. The City of London within and without the walls (with the exception of thirteen parishes which are peculiars of the archbishopric of Canterbury, one parish which is a peculiar of the bishopric of London, and four parishes which are in the peculiar jurisdiction of the dean and chapter of St. Paul's), the parishes of St. James, Clerkenwell, St. Leonard, Shoreditch, and St. Mary, Islington, and the precincts of Portpool, Hoxton, Norton Folgate, and Goswell-street, constitute the archdeaconry of London. The rest of the county (with the exception of twelve parishes which are in the peculiar jurisdiction of the bishop of London, seven which are in the peculiar jurisdiction of the dean and chapter of St. Paul's, and two which are peculiars of the archbishop of Canterbury) is included in the archdeaconry of Middlesex. The number of parishes and chapelries in the county, when Newcourt drew up his account of the diocese, was as follows:—

In London:	
Under the archdeacon of London	92
Peculiars	18
In the rest of Middlesex.	
Under the archdeacon of London	3
Under the archdeacon of Middlesex	52
Peculiars	21
Total	186

Since Newcourt's time the number of ecclesiastical divisions and benefices has considerably increased, through the subdivision of the larger parishes near London, such as Stepney, Hackney, Islington, St. Pancras, and St. Marylebone.

The county is, in civil suits, within the immediate jurisdiction of the superior courts sitting in the metropolis. In criminal cases of the more important class it is within the jurisdiction of the Central Criminal Court, held in the Old Bailey in London. Sessions, at which lighter criminal offences are tried, are held at the Sessions-house, Clerkenwell, twelve times in the year, and at Guildhall, for the city of London, eight times in the year. Sessions are also held for the city of Westminster. The city is under the police jurisdiction of its own aldermen; other parts immediately round London have police-offices, with stipendiary magistrates. The parts more distant from London are under the county magistrates.

The shrievalty of Middlesex is united with that of London. Two sheriffs are annually chosen by the Livery of London in common hall. London has a body of police of its own: the suburbs are watched by the metropolitan police, a numerous body of men under the direction of two commissioners.

Fourteen members of parliament are returned from Middlesex, namely, two for the county, four for the city of London, two for the city of Westminster, and two each for the new metropolitan boroughs of Marylebone, Finsbury, and the Tower Hamlets. The borough of Marylebone comprehends the three parishes of St. Marylebone, St. Pancras, and Paddington; that of Finsbury, various parishes and liberties in the Finsbury division of Ossulston hundred; and that of the Tower Hamlets, the liberties of the Tower and the Tower division of Ossulston hundred.

History and Antiquities.—In the earliest period of authentic history this part of our island was comprehended in the domains of the Trinobantes, who occupied Essex. It was traversed by Cæsar in his second expedition into Britain (B.C. 54), after his successful attempt to cross the Thames at Coway Stakes near Chertsey. [BRITANNIA.] It fell under the Roman dominion in the time of Claudius, but was overrun by the Britons in the general revolt under Boadicea. [BOADICEA.] Londinium (London) was already a place of considerable trade, and the residence of many Romans. In the Roman division of the island the county was included in the province of Flavia Cæsariensis, and contained the stations of Londinium, Pontes (according to some), and Sulloniacæ. Of Londinium [LONDON] nothing need here be said. Pontes has been variously fixed, at Colnbrook and at Old Windsor in Berks, and at Longford and Staines in Middlesex. Sulloniacæ was at Brockley Hill, between Edgware and Elstree. There are, or were till lately, traces of Roman camps at Stanmore, in the fields near Islington, and at Shepperton, near the place where Cæsar crossed the Thames. The Roman Watling Street from Londinium ran through Sulloniacæ to Verulamium (near St. Alban's). Ermine Street ran from Londinium northward by Stoke Newington to Enfield, and other roads led from Londinium by Pontes and across the Thames to the south-west parts of England, and across the Lea into Essex. Of this last the fragment of a stone causeway in the marshes of the Lea, between Hackney Wick and Old Ford, may be regarded as a remain. The Thames was known to the Romans by the names Tamesis and Jamissa. The Roman names of the Lea, the Colne, and the Brent, are not known.

Beside various Roman antiquities found in London, others have been discovered in various parts of the county. At Bentley near Stanmore fifty gold coins and several of silver and copper were found, together with two rings and a bracelet, all of gold. Coins, urns, or other Roman antiquities have been dug up at Hampstead, Shepperton, and Turnham Green near Brentford.

In the Saxon division of the island this county is generally considered to have been a part of the kingdom of the East Saxons; but we think this may be questioned. Sir F. Palgrave has shown that among the Saxon states there were more than seven or eight which were properly distinct from each other, although the weaker were commonly held in subjection by their more powerful neighbours. (*History of England (Anglo-Saxon Period)*, in the *Family Library*.) Of these petty kingdoms or states we consider Middlesex (the territory of the Middle-Saxons) to have been one; for we do not think the name would have been given had Middlesex been, according to the common opinion, only a frontier

district of the East-Saxon kingdom. It may have been governed occasionally by the kings of Essex,—it is known that these at least possessed many extensive rights in the city of London; but Essex was itself little more than a dependency of Kent, and never enjoyed a period of political independence. It favours our supposition that Middlesex was not a mere province or county of the East Saxons, to find that in the division of England under Alfred, while the county of Essex and part of Hertfordshire were included in the Danelagh, or Danish territory, London and the rest of Middlesex were placed under the alderman of Mercia. (Sir F. Palgrave, *Rise and Progress of the English Commonwealth*, vol. i., pt. i., pp. 116, 402; pt. ii., pp. cclxxxiii., cccv.) It is however to be observed that some early authorities make Middlesex a part of the Danelagh. (Sir F. Palgrave, *Ibid.*, pt. i., pp. 48, 572.)

In the wars which the West Saxon princes sustained with the Danes, London was repeatedly taken by that people. In the great struggle between Alfred and the Danish chieftain Hastings the citizens bore a distinguished part. In the reign of Athelstan, London became the occasional residence of the king. In A.D. 1013 London submitted to the Danes under Svein or Sweyne, Ethelred II., whom they had endeavoured to support, having fled. In the following year the citizens threw off the Danish yoke, and recalled Ethelred. In the reign of Edmund II. Ironside, London was besieged by the Danish king Canute, but the siege was raised, after continuing some time, on the approach of Edmund. A battle between the rival princes was fought the same year at Brentford, the issue of which enabled Canute to resume the siege of London, but with no better success. The subsequent death of Edmund however brought the whole island under the sway of Canute.

London, having become, under the later Saxon princes or under the Norman dynasty, the seat of government, was the scene of many events which belong not to the provincial but to the general history of the country. In A.D. 1189, at the coronation of Richard I., there was a dreadful massacre of the Jews by the populace at Westminster. In A.D. 1196 a great tumult arose in London, headed by William Fitz-Osborn, surnamed Longbeard. In A.D. 1212 London was much damaged by a great fire. In the civil wars of John the citizens took the side of freedom. The Great Charter was signed by that king close upon the border of the county, between Staines and Windsor. In the subsequent war against the king, the citizens supported the cause of the dauphin Louis, who was however ultimately shut up in London, and compelled to relinquish his attempt on the kingdom. In A.D. 1222 another tumult of the Londoners arose: it was however quelled, the ringleaders executed or otherwise severely punished, and the city severely mulcted. In A.D. 1232 another great fire happened. In the following years many struggles were maintained against the injustice and oppression of Henry III. by the citizens, who, on the breaking out of the civil war, A.D. 1264, eagerly joined the insurgent barons. They burned the palace of the King of the Romans at Isleworth, and a summer-house belonging to the king at Westminster. On the suppression of this insurrection, after the battle of Evesham (A.D. 1265), the citizens were compelled to purchase exemption from the loss of their privileges by heavy payments. Just before the breaking out of this insurrection there was a great massacre of the Jews in London. In the year 1267 the city was occupied by the earl of Gloucester, who repelled for a time the king's army. He was however obliged to submit.

In the civil wars of Edward II. the city was first threatened and then occupied by the insurgent barons, A.D. 1320. At a subsequent stage of the troubles, A.D. 1322, several of the supporters of the king, and his favourites, the two Despencers, were put to death by the populace. In the subsequent reign of Edward III. a considerable tumult was excited on occasion of Wicliffe being cited before a synod at St. Paul's. The duke of Lancaster and Lord Percy, earl-marshal, afterwards well known as the earl of Northumberland, supported Wicliffe, while the citizens supported the bishop of London, whom they supposed to be threatened by those nobles. This tumult had almost cost the city its municipal privileges, and led to the removal of the lord-mayor and aldermen, on the plea that they had not properly exerted themselves to put the citizens down.

The rising of the Commons under Wat Tyler, A.D. 1381, belongs to the history of England. In 1387 the earls of Warwick and Arundel and the duke of Gloucester assembled a considerable force at Hornsey Wood, to oblige the king to put away his followers. In A.D. 1388 the same lords with their followers assembled a force and marched to London, into which, after some hesitation, they were admitted. In A.D. 1390 the citizens of London, having offended the king, were obliged to appease him by a gift of 10,000*l.* to prevent much heavier consequences. The alienation produced by the king's oppressive conduct induced the citizens early to declare for his rival Henry of Bolingbroke, afterwards Henry IV.

In the reign of Henry V., early in the year 1413, several Wicliffites were seized in St. Giles's Fields by the king in person, who came upon them with an armed force. Treasonable purposes were imputed to them, and a great number were put to death. In the reign of Henry VI., A.D. 1450, London was seized by the insurgents under Cade, who committed great excesses, but after a sharp struggle was driven out by the citizens. At the commencement of the war of the Roses, a meeting of the leaders on both sides was held at London, with a view to a reconciliation, and a compromise effected; but some tumults arising between their retinues, suspicions arose again, and each party prepared for war. In A.D. 1460 the Yorkists were admitted into the city, while the king's troops occupied the Tower, from which they fired on the city. The citizens however obliged the garrison to surrender. In the same year the king was brought captive to London, and a peace was effected, which was very soon broken. The queen was about to re-enter London, when the approach of the earl of March obliged her to retire. The earl was declared king by his army, the citizens, and the nobles of his party, first in St. John's Fields, Clerkenwell, and afterwards at Baynard's Castle, in London, A.D. 1461. He assumed the title of Edward IV. In the year 1465 Henry VI., who had been again taken, was brought prisoner to London, and confined in the Tower. In 1470 he was released by the earl of Warwick. During the troubles of this period, a band of plunderers committed great excesses, but were put down by the earl of Warwick and duke of Clarence, and the leaders immediately hanged. In 1471 the Yorkists recovered the city, and Warwick was defeated and slain in the battle of Barnet. An obelisk erected on the spot records the event.

Edward, immediately after his victory at Barnet, marched to London, and, after parading the captive Henry through the streets, quitted the capital to engage Margaret, Henry's queen, at Tewkesbury. In his absence, London was attacked by the Bastard of Fauconbridge, who, after several repulses, retired. Henry died in the Tower very soon after, and Edward died at Westminster, A.D. 1483. The murder of Edward V. and the usurpation of Richard III., the coronation of Henry VII., his marriage, and the coronation of his queen, at Westminster (A.D. 1483-87), took place in London. In the reign of Henry VII. Perkin Warbeck was set in the stocks in London, and, about a year after, executed at Tyburn, for attempting to escape from the Tower, where he had been confined.

London was the scene of many of those acts of cruelty that have stained the memory of Henry VIII., and which need not be here enumerated. In Wyat's rebellion against Mary (A.D. 1554), the city was threatened by the rebels, who, after obtaining possession of Southwark, marched to Kingston, crossed the Thames, and marched through Brentford and Turnham Green to attack London. Wyat was however repulsed and obliged to surrender. The execution of Lady Jane Grey and her husband followed; fifty of Wyat's followers were hanged in different parts of the city, and Wyat himself was beheaded soon after. At the time of the Armada, London raised a body of 10,000 men, and the rest of the county 1000 more, with a few light horse and lancers. The city also furnished twenty-nine ships and barks, and above 2000 men: and the merchant adventurers ten ships of war. In A.D. 1601 the city was disturbed by the tumult excited by the earl of Essex, who was taken, and, with many of his supporters, beheaded. In A.D. 1605 the well-known gunpowder plot was formed and detected.

The commencement of the civil troubles of Charles I. was marked by some disturbances at London, which was devoted to the parliamentary cause; and on the breaking out of the war, the passages about the city were fortified, and the trained bands raised. After the battle of Edge Hill, the earl of Essex returned to London; and the king pursued him as far as Brentford, which, after a sharp action,

he captured. On this, the trained bands and other forces under Essex marched to Turnham Green, but no battle was fought, and the king soon quitted the county. In A.D. 1643 the cities of London and Westminster with Southwark were surrounded by defensive works of great extent, which were demolished by order of parliament, about four years afterward. In 1645 the conferences for peace at Uxbridge were held. In 1648 a tumult arose in the city, and the rioters were not put down until after some bloodshed; and in 1649 Charles I. was beheaded.

In 1661, after the Restoration, London was again made the scene of tumult by the Fifth Monarchy-men under Venner. The great plague of London in 1665, and the great fire of 1666, are events well known; also the great agitation of the metropolis during the supposed discovery of the popish plot. The attempts upon the city charters and the severities inflicted upon some leading citizens in the closing years of Charles II. and in the reign of James II. are also well known.

In the year 1688 James II. formed a camp on Hounslow Heath; but his army, partaking of the national feeling, deserted him. In A.D. 1710 London was much agitated by the trial of Dr. Sacheverell. In the rebellion of 1745, a camp was formed on Finchley Common, and the city trained bands and county militia were kept in readiness to march. In 1780 London was the scene of destructive riots, occasioned by popular hatred to Catholicism. In 1815 there were some tumults on account of the corn-laws, and a few years afterwards on account of reform in parliament. Since then there has been no event in the history of the county of sufficient importance to be noticed here. (*Beauties of England and Wales; Ordnance Maps;* Conybeare and Phillip's *Outlines of the Geology of England and Wales; Parliamentary Papers.*)

STATISTICS.

Population.—Middlesex, as containing the great metropolis of the United Kingdom, of course cannot be compared with any other county of England, the population in proportion to its surface being vastly greater; the population of the other part of the county not included in the metropolis is not a fourteenth of the whole. As an agricultural county Middlesex therefore ranks very low, being the 42nd, or the very lowest in the scale. Of 358,521 males twenty years of age and upwards, living in 1831, only 12,516 were engaged in agricultural pursuits, and 11,064 in manufactures or in making manufacturing machinery. In this latter number is not included that numerous class of workmen of the best kind in all descriptions of manufactures, who are employed in London for combining, fitting, and finishing all the commodities requisite for the consumption and vast commerce of the metropolis. Workmen so employed are classed and specified in the detail of trades and handicrafts to the amount of four hundred different kinds. Independent of these, the manufactures of Middlesex are not of importance. More than 5000 males twenty years of age and upwards are employed in the manufacture of silk at Bethnal Green and its neighbourhood. At and near Whitechapel 440 men are employed in sugar-refinery. At Limehouse, sail-cloths and chain-cables are made; crape and oiled leather at Enfield; copper-works exist at Harefield, and mustard-mills at Staines.

The following table contains a summary of the population, &c. of every hundred, as taken in 1831:—

HUNDREDS, CITIES, OR BOROUGHS.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Edmonton hundred	4,801	5,616	79	359	1585	1,620	2,411	12,969	13,961	26,930	6,242
Elthorne „	3,791	4,224	8	220	1248	1,505	1,471	9,998	10,093	20,091	5,143
Gore „	1,726	2,049	9	82	794	619	636	5,697	5,618	11,315	2,718
Isleworth „	2,454	2,871	43	151	976	736	1,159	6,515	7,053	13,568	3,209
Ossulston:											
Finsbury division	20,516	34,569	558	2,049	827	21,865	11,877	70,641	80,768	151,409	38,153
Holborn „	36,554	83,467	1428	2,391	576	41,898	40,993	154,743	191,512	346,255	93,118
Kensington „	13,415	20,179	295	1,060	2062	9,458	8,659	39,217	48,741	87,961	20,827
Tower „	57,170	84,282	977	5,940	801	52,897	30,584	168,146	191,718	359,864	89,304
Spelthorne hundred	2,715	3,175	29	166	864	954	1,357	7,325	7,887	15,212	3,798
London within the Walls (City)	8,002	11,719	32	705	1	7,077	4,641	27,327	28,451	55,778	16,869
London without the Walls (City)	8,733	15,884	49	426	29	11,101	4,754	33,413	34,492	67,905	19,147
Westminster city	20,616	46,004	412	864	119	24,092	21,793	95,219	106,623	201,842	59,963
Militia under training	—	—	—	—	—	—	—	200	—	200	—
Totals	180,493	314,039	3919	14,413	9882	173,822	130,335	631,410	726,920	1,358,330	358,521

The population of Middlesex, at each of the four following periods, was:—

	Males.	Females.	Total.	Increase per cent.
1801	373,655	444,474	818,129	..
1811	434,633	518,643	953,276	16·52
1821	533,573	610,958	1,144,531	20·06
1831	631,410	726,920	1,358,330	18·69

showing an increase between the first and last periods of 540,201, or about 67 per cent. on the whole population, being 10 per cent. more than the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the four dates of—

		£.		s.	d.	
1801	were	349,200,	being	8	6	for each inhabitant.
1811	..	502,967	„	10	6	„
1821	..	582,055	„	10	2	„
1831	..	681,567	„	10	0	„

The sum expended for the same purpose for the year ending March, 1838, was 383,076*l.*; and assuming that the population had increased at the same rate of progression as in the ten preceding years, the above sum gives an average of nearly 5*s.* for each inhabitant. This last average is below that for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending 25th March, 1833, was 968,724*l.* 19*s.*, and was levied upon the various descriptions of property as follows:—

On land	£69,833	13*s.*
Dwelling-houses	823,248	15
Mills, factories, &c.	57,352	2
Manorial profits, navigation, &c.	18,290	9
Total	£968,724	19

The amount expended was—

For the relief of the poor . .	£647,013	6s
In suits of law, removal of paupers, &c.	19,915	15
For other purposes . .	336,959	18
Total money expended	1,003,888	19

In the returns made up for subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 939,890*l.* 6*s.*, 754,660*l.* 17*s.*, 641,378*l.* 15*s.* (not stated in tables for 1837), and 573,106*l.* respectively; and the expenditure of each year was as follows:—

	1834.	1835.		1836.	1837.	1838.
	£.	£.	s.	£.	£.	£
For the relief of the poor	582,412	493,041	16	408,027	360,981	383,076
In suits of law, removal of paupers, &c. .	20,427	14,685	3	12,335	9,351	7,715
Payments towards the county-rate . .	313,678	64,588	10	66,154	not given.	71,580
For all other purposes		187,044	18	174,174	173,460	165,359
Total money expended	£916,517	749,360	7	660,690	543,795	627,730

The saving effected on the sum expended in 1838, as compared with that expended in 1834, was therefore 288,787*l.* 15*s.*, or about 31½ per cent.; and the saving effected on the sum expended for the relief of the poor was 199,336*l.*, or rather more than 34 per cent. as compared with the expenditure in 1834.

The number of turnpike trusts in Middlesex, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 7; the number of miles of road under their charge was 158. The annual income arising from tolls and parish compositions in lieu of statute duty was (in 1835) 96,744*l.* 14*s.*, and the annual expenditure in the same year was as follows:—

	£.	s.	d.
Manual labour . .	14,169	19	0
Team labour and carriage of materials	12,741	11	0
Materials for surface repairs .	36,207	13	0
Land purchased . .	50	10	0
Damages done in obtaining materials	47	14	0
Tradesmen's bills . .	4,992	4	0
Salaries of treasurer, clerk, and surveyor	4,030	17	0
Law charges . . .	1,505	2	0
Interest of debt . . .	5,806	7	0
Improvements . . .	4,506	19	0
Debts paid off . . .	9,100	0	0
Incidental expenses . .	8,313	12	0
Estimated value of statute duty performed . . .	26	5	0
Total expenditure	£101,498	13	0

The county expenditure in 1834, exclusive of that for the relief of the poor, was 69,373*l.* 18*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building, repairs, &c.	2,831	17	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	22,819	7	0
Shire-halls and courts of justice, building, repairing, &c. .	1,943	4	0
Prosecutions . . .	6,674	4	0
Clerk of the peace . .	1,782	9	0
Lunatic Asylums . .	1,631	4	0
Vagrants, apprehending and conveying	1,105	19	0
Constables, high and special .	120	19	0
Coroner . . .	1,534	12	0
Debt, payment of, principal and interest	26,190	0	0
Miscellaneous . . .	2,740	3	0
Total expenditure	69,373	18	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were respectively 16,692, 19,883, and 24,965; making an average of 2387 annually in the first period, of 2840 in the second period, and of 3566 in the third period. The numbers of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect of whom any costs were paid out of the county rates, were 202, 224, and 1180 respectively. Among the persons charged with offences, there were committed for—

	1831.	1832.	1833.
Felonies . .	128	152	1094
Misdemeanors .	74	72	86

The total number of committals in each of the same years was 1707, 1701, and 2977 respectively.

	1831.	1832.	1833.
The number convicted was	293	342	1368
Acquitted . .	109	105	239
Discharged by proclamation	1305	1254	1370

In 1838 there were 3488 persons charged with crimes at the assizes and sessions in Middlesex. Of these 329 were charged with offences against the person, 204 of which were common assaults; 150 were charged with offences against property committed with violence, and 2740 with offences against property committed without violence. Of the remaining number 4 were charged with arson; 143 with forgery, and with uttering counterfeit coin; 11 with perjury, 27 for riot, and 84 for various other misdemeanors.

Of the whole number committed, 2578 were convicted, 625 were acquitted, 29 were not prosecuted, no bill was found against 246, and 10 were found insane. Of those convicted, 4 were sentenced to death, not one of whom was executed; the sentences against them being commuted to transportation for various periods: of the remaining offenders, 22 were transported for life, 2 for fifteen years, 86 for ten, and 707 for seven years. Sentence of imprisonment for 3 years, or above 2 years, was passed on 3; 70 were imprisoned for 2 years, or above 1 year; 193 for 1 year, or above 6 months; and 1365 for 6 months or under: 126 were fined. Of the whole number of offenders, 2663 were males and 825 females; 919 could neither read nor write, 1818 could read and write imperfectly, 682 could read and write well, 7 had received superior instruction, and the degree of instruction of the remaining 62 could not be ascertained.

The number of persons qualified to vote for the county members, and registered, in 1837, was 12,817. Of these, 9485 were freeholders, 1065 leaseholders, 975 copyholders, and 1292 occupying tenants, being one in 106 of the whole population, and one in 28 of the male population twenty years and upwards, as taken in 1831. The number of electors that voted at that election was 9214, viz. 6739 freeholders, 730 copyholders, 809 leaseholders, and 936 occupying tenants.

This county contains 27 savings' banks; the number of depositors and amount of deposits on the 20th of November, in each of the following years, were as under:—

	1832.	1833.	1834.	1835.
Number of depositors . .	50,827	56,709	62,543	68,237
Amount of deposits .	£1,393,360	£1,553,930	£1,705,308	£1,844,350

The various sums placed in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	43,134	£270,806	47,200	£288,362	52,742	£331,334
" 50	19,895	612,603	21,627	662,401	24,075	7[illegible]062
" 100	3,202	565,050	8,830	609,370	9,685	666,125
" 150	2,502	301,677	2,689	323,618	3,140	377,648
" 200	1,261	214,280	1,316	224,555	1,558	206,065
Above . 200	201	49,757	179	44,994	179	45,005
	75,195	2,014,173	81,841	2,153 300	91,379	2,424,239

Education.—The following is an abstract taken from the Education Returns laid before parliament in 1833:—

	Schools.	Scholars.	Total.
Infant schools . . .	109		
Number of infants at such schools; ages from 2 to 7 years:—			
Males . .		3,065	
Females . .		2,411	
Sex not specified .		3,226	
			8,732
Daily schools . . .	2,152		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		49,991	
Females . .		34,446	
Sex not specified .		8,051	
			92,488
Schools . .	2,261		
Total of children under daily instruction . . .			101,220

	Schools.	Scholars.	Total.
Sunday-schools . . .	329		
Number of children at such schools; ages from 5 to 15 years :—			
Males . .		23,440	
Females . .		23,225	
Sex not specified .		5,456	
		——	52,121

If we assume that the population between the ages of 2 and 15 years had increased in the same proportion as the whole population since 1821, and that the whole population had increased from 1831 to 1833 in the same ratio as during the ten years preceding 1831, we find that the number of children between the ages of 2 and 15 residing in Middlesex in 1833 was 469,563. Only two Sunday-schools are returned from places where no other schools exist, wherefore it may be said that all Sunday-school children in this county have opportunity of resorting to other schools also; but in what number or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Seventy-five schools, containing 11,529 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. At a few of the schools there are some scholars twenty years of age. Making allowance therefore for these two causes, for uncertainty, it appears that not more than one-quarter of the children between the ages of 2 and 15 are under instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars		Subscrip. and payment from scholars.	
	Schls.	Scholars	Schls.	Scholars.	Schls.	Scholars.	Schls	Scholars.
Infant Schools	3	530	28	2,610	31	603	47	4,989
Daily Schools	107	9,266	184	23,927	1746	43,715	115	15,550
Sunday Schools	3	311	290	46,878	.	. .	36	4,932
Total....	113	10,107	502	73,415	1777	44,348	198	25,471

The schools established by Dissenters, included in the above statements, are—

		Scholars.
Infant schools . .	7, containing	577
Daily schools . .	103 .	9,170
Sunday-schools . .	150 .	27,689

The schools established since 1818 are—

		Scholars.
Infant and other daily schools	1,719, containing	67,158
Sunday-schools . .	219 .	37,484

Two hundred and thirty-eight boarding-schools are included in the number of daily schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by dissenters, with whom are here included Wesleyan Methodists, Roman Catholics, and Jews. Lending libraries of books are attached to 164 schools in Middlesex.

MIDDLETON, THOMAS, a celebrated dramatist in the reigns of Elizabeth, James I., and Charles I., the events of whose life are even less known than those of most of his contemporaries: indeed not a single circumstance is recorded respecting him by a writer of his own time; and excepting the fact that he was appointed chronologer to the city of London in 1620, mentioned by Oldys in his MS. notes to Langbaine, we are absolutely ignorant of his biography. He is supposed by Malone to have died in 1626.

The plays written by Middleton are very numerous. three of them, '*A Mad World, my Masters*,' the '*Mayor of Queenborough*,' and the '*Roaring Girl*,' are in Dodsley's Collection, and the rest can only be procured separately. The '*Roaring Girl*' is extremely valuable, as giving a picture of London manners in the author's time; it is interspersed with much of the slang which we find in Beaumont and Fletcher's '*Beggar's Bush*,' and the heroine is a real character, the notorious Moll Cutpurse, who was introduced by Nat. Field, a contemporary dramatist, in his piece, 'Amends for Ladies.' A play of Middleton's, called 'The Witch,' has gained celebrity from the circumstance that Shakspere is supposed by some to have borrowed from it his incantations in 'Macbeth.' Besides the numerous pieces by himself alone, Middleton assisted Rowley in 'The Changeling,' 'The Spanish Gipsy,' and 'The Fair Quarrel,' and both him and Massinger in 'The Old Law;' he also joined with Fletcher and Jonson in the composition of 'The Widow,' which is printed in Dodsley.

Middleton does not hold the first rank among the dramatists of his day. His two best known plays, 'A Mad World, my Masters,' and the 'Roaring Girl,' are chiefly marked by a bustling variety of plot, a succession of incidents somewhat extravagant, and a familiarity with low life. He was however valued by his contemporaries, as is proved by his being chosen to assist such men as Jonson and Massinger.

MIDDLETON, SIR HUGH, was the sixth son of Richard Middleton, Esq., who was governor of Denbigh Castle, in Denbighshire, during the reigns of Edward VI., Mary, and Elizabeth. The name was variously spelt in those times, Mydelton, Myddleton, or Midleton. The date of Hugh Middleton's birth is unknown, and nothing has been recorded of the course of his life previous to his great undertaking of forming the New River and bringing it to London, except that he was a goldsmith in London, and had realised a very large property by the working of some copper-mines in Wales; and the decisive boldness with which he engaged in so vast and difficult an enterprise was probably the result of his having, in the conducting of his own mining speculations, acquired that practical knowledge of levelling, draining, embanking, and all the diversity of skill and fertility of resources necessary for the management of such a work. [MINING.]

Towards the latter end of the reign of Elizabeth, the metropolis of England being very inadequately supplied with water, the citizens of London obtained an act of parliament which gave them the legal authority to bring water from any part of Middlesex or Hertfordshire. For a considerable time however nothing was done, till, on the 28th of March, 1606, Hugh Middleton, 'citizen and goldsmith,' offered to bring to London a sufficient supply of pure water at his own cost. His offer was accepted; the citizens made over to him all the powers and privileges conferred by the act; and four years were allowed to complete the work. Having made the necessary surveys and preparations, and fixed on the Chadwell and Amwell springs, near Ware, in Hertfordshire, as the sources out of which his New River was to be formed, on the 20th of April, 1608, he commenced a work which, considering the imperfect mechanical resources of that age, may justly be regarded as stupendous. The distance from London by the road is about twenty miles, but the whole course of the river is thirty-seven miles. The ground through which it was to be brought presented much difficulty from its diversity of bottom as well as of level. In some places it was necessary to cut a channel thirty or forty feet deep; in others, to conduct the stream over valleys in troughs on wooden supports upwards of twenty feet high; and a vast number of bridges were to be constructed for the accommodation of those through whose grounds the stream was carried. These difficulties, together with others arising from the opposition of interested and influential persons, rendered it impossible to complete the work in the stipulated four years, and Middleton applied for an extension of the time, which was granted. Soon afterwards however he found that his large property was entirely exhausted. He applied to his fellow-citizens for assistance, but he applied in vain. He then solicited the king, James I., who, on the 2nd of May, 1612, entered into a covenant with Middleton, by which he engaged to pay half the expense, past and future, on condition of being entitled to half the property. The work was now pushed forward with increased vigour, and on the 29th of September, 1613, five years and five months from the commencement of the undertaking, and the day on which Sir Thomas Middleton, Hugh's brother, was elected lord-mayor for the ensuing year, the stream was admitted into the reservoir prepared for it at Sadler's Wells, near Pentonville. In the 'Biographia Britannica' an interesting account is given of the ceremony on this occasion, which was attended by the lord-mayor then in office, the aldermen, the recorder, and many of the principal citizens. The whole expense of the work was about 500,000*l.* Middleton was knighted soon afterwards, but for eighteen years after the completion of his undertaking no dividend was returned, and in the nineteenth year the first dividend only amounted to 11*l.* 19*s.* 1*d.* on each share.

Sir Hugh Middleton was compelled to sell his shares, and to support himself by the profession of what is now called a civil engineer. On the 19th of October, 1622, he was created a baronet for the following reasons (the king by special warrant kindly excusing him from the payment of

the usual fine of 1095*l.*):—'1. For bringing to the city of London with excessive charge and greater difficulty a new cut or river of fresh water, to the great benefit and inestimable preservation thereof. 2. For gaining a very great and spacious quantity of land in Brading Haven in the Isle of Wight, out of the bowelles of the sea; and with banks and pyles and most strange defensible and chargeable mountains, fortifying the same against the violence and fury of the waves. 3. For finding out, with a fortunate and prosperous skill, exceeding industry, and no small charge, in the county of Cardigan, a royal and rich mine, from whence he hath extracted many silver plates, which have been coined in the Tower of London for current money of England. W. Camden, Clarenceux, November 1, 1622.' (*Harleian Misc.*) On the 18th of November, 1636, Charles I. regranted to Sir Hugh the whole of King James's shares for an annual rent of 500*l.* Middleton is supposed to have died soon afterwards, leaving a numerous family in very indifferent circumstances.

The springs near Ware are beautifully clear and very copious; but, a great many years ago, the supply having been found inadequate to the demands of the increased population, the New River Company entered into an agreement with the Commissioners of the Lea River to take a portion of the Lea at Ware, which was conveyed at first through pipes, but some years afterwards it was agreed that there should be an opening made of six feet by two, which is called the Marble Gauge. The Amwell spring now runs into the Lea River, and has done so for a great number of years; but an ample supply having been obtained from the Lea, it is presumed that the New River Company made no objection to the Amwell spring being turned from its original course; the time however when it was done is not certainly known.

The fall of the New River is three feet per mile, which gives a velocity of about two miles an hour. The average width is about 21 feet, and the average depth about four feet in the centre; so that, taking it at half the depth, there is a section of forty-two square feet flowing to London at the rate of two miles an hour. At the Sluice, near Highbury, the river is dammed back to the height of twenty inches, at Enfield to two feet four inches, and there are three or four more similar interruptions for the purpose of checking the current. This has been done because the Commissioners of the Lea complained that the New River Company, by enlarging the bridges and taking off the bends of the river to bring it more speedily to London, took more water than they were legally entitled to. They could take one-third more if they had the right; but not having enough, they have erected a steam-engine at Broken Wharf, which pumps up an additional supply from the Thames, pouring it directly into the main-pipe. To get rid of the engine at Broken Wharf the New River Company have tried, but hitherto, we believe, in vain, to get an act of parliament granting the right to take an additional supply from the Lea at Tottenham, and with that view have purchased Tottenham mill, together with fifty acres of ground, which they could convert into a reservoir.

The New River, especially in winter, is occasionally rendered dirty by drainage from the land and villages along its course, and the company have been at great expense to purify the water before it is delivered to the inhabitants of London. For this purpose two settling reservoirs were formed at Stoke Newington in 1832, under the direction of Mr. Mylne, the Company's engineer. The water covers an area of thirty-eight acres, more than twenty feet deep in some places, and twelve feet on the average. A part or the whole of the New River can be turned into the upper reservoir, where it settles, and is then drawn off by a steam-engine, and poured into the lower reservoir, where another settlement takes place, and the water is then turned again into the channel of the New River. Bathing in the New River is now entirely prohibited; and men called walksmen mow the bed of the river every week to keep down the growth of weeds, which are stopped by gratings seven miles from each other, where the weeds are taken out.

The capital of the Company has been stated by themselves to be 1,038,426*l.*, divided into 72 shares, or 14,426*l.* per share.

We subjoin a short table founded upon a 'Report on the Metropolis Water,' printed by order of the House of Commons, in August, 1834; by which it will be seen that the New River furnishes almost as much as the other seven companies united, supplying 70,145 houses (including large manufactories, breweries, &c.) with 16,905,000 gallons of water daily, at the average rate of 241 gallons per day to each house, at an average charge of less than 1*d.* per day.

	Houses.	Gallons daily to each house.	Total gallons per day.	Charge yearly to each house. £	s.	d.
New River	70,145	241	16,905,000	1	6	6
Chelsea	13,892	168	2,334,000	1	13	3
Grand Junction	8,780	350	3,073,000	2	8	6
West Middlesex	16,000	185	2,960,000	2	16	10
East London	46,421	120	5,571,000	1	2	9
South London	12,046	100	1,204,000	0	15	0
Lambeth	16,682	124	2,069,000	0	17	0
Southwark	7,100	156	1,108,000	1	1	3
	191,066		35,224,000			

(Stow's *Survey of the City of London*: *Biographia Britannica*; Nelson's *History of Islington*; *Report on the Metropolis Water*, 1834.)

MIDDLETON, CONYERS, born August 2nd or December 27th, 1683, was the son of William Middleton, rector of Hinderwell, near Whitby in Yorkshire. At the age of seventeen he was sent to Trinity College, Cambridge, of which college he was two years afterwards chosen a scholar. He took his degree of B.A. in 1702, and was shortly after ordained deacon. In 1706 he was elected a fellow of Trinity College; and in 1708, joined with other fellows of his college in a petition to the bishop of Ely, as the visitor of the college, against Bentley the master. Middleton, who was then a young man, did not take a prominent part in this proceeding; but the feelings of hostility to the master originated by these disputes sank deep into his mind, and made him subsequently the most determined and dangerous of his enemies.

Middleton married soon afterwards, and resided for a short time in the Isle of Ely on a small living in the gift of his wife, but the unhealthiness of the situation induced him to return to Cambridge at the end of a year.

When George I. visited the university of Cambridge in 1717, Middleton, with several others, was created Doctor of Divinity; but Bentley, who was Regius Professor of Divinity, refused to confer the degree unless a fee of four guineas was given to him in addition to the broad piece which was the antient and customary compliment on this occasion. This demand was resisted by Middleton, who however at last consented to pay it, on condition that the money should be restored if it should be determined that it was an illegal demand. Middleton sued Bentley for it in the vice-chancellor's court; and Bentley, refusing to pay the money or to acknowledge the jurisdiction of the court, was deprived of all his degrees by a grace of the senate, October 17, 1718. [BENTLEY.] As Bentley was a firm supporter of the Whig ministry then in power, it was feared that a commission might be issued by the crown to inquire into the state of the university; and Middleton, to justify himself and his friends, accordingly published 'A full and impartial Account of all the late Proceedings in the University of Cambridge against Dr. Bentley,' which, says Dr. Monk, 'was the first published specimen of a style, which, for elegance, purity, and ease, yields to none in the whole compass of the English language. The acrimonious and resentful feeling which prompted every line is in some measure disguised by the pleasing language, the harmony of the periods, and the vein of scholarship, which enliven the whole tract.' (*Life of Bentley*, p. 388.)

A few months afterwards, Middleton published 'A Second Part of the full and impartial Account of all the late Proceedings, &c.,' and also 'A true Account of the present State of Trinity College, in Cambridge, under the oppressive Government of their Master, R. Bentley, late D.D.' In the latter pamphlet Middleton had declared 'that the fellows of Trinity College had not been able to find any proper court in England which would receive their complaints;' and Bentley perceiving that his adversary had been guilty of an expression which might be considered as a libel upon the whole administration of justice in the kingdom, brought an action against him in the Court of King's Bench, in which the jury returned a verdict of guilty. The court however was unwilling to pronounce sentence, and the matter eventually dropped by Middleton's begging pardon of Bentley and consenting to pay all the expenses of the action, which must have been considerable, since the share of the expenses of the prosecution not allowed by the

master of the court, and paid by Trinity College, amounted to 150*l*.

While this matter was pending, Bentley published Proposals for a new edition of the Greek Testament, with a specimen of the intended work. The proposals and specimen were drawn up by candle-light one evening, according to Bentley's own confession; and the whole sheet bore marks of precipitation and haste. Middleton eagerly availed himself of the opportunity which the carelessness of his great enemy had afforded him, and accordingly published a severe critique upon it, in a pamphlet entitled 'Remarks, paragraph by paragraph, upon the Proposals lately published by R. Bentley for a new edition of the Greek Testament,' and followed up his attack by 'Some further Remarks' a few weeks afterwards. Although Middleton professed, in the commencement of the pamphlet, that 'his remarks were not drawn from him by personal spleen or envy to the author of the Proposals, but by a serious conviction that he had neither talents nor materials proper for the work he had undertaken, and that religion was much more likely to receive detriment than service from it,' he nevertheless condescended to the lowest abuse against his antagonist; but it must be allowed that in this respect he was hardly a match for the master of Trinity.

As Middleton had been put to great expense and trouble by his recent prosecution, his friends in the university, regarding him as a sufferer in a public cause, resolved to bestow some public mark of distinction upon him, and accordingly established a new office of principal librarian, to which Middleton was elected notwithstanding the violent opposition of the other party. Shortly after his election, he published a plan for arranging the university library, which was entitled 'Bibliothecæ Cantabrigiensis Ordinandæ Methodus quædam,' 1723; in the dedication of which to the vice-chancellor he expressed himself in a manner which appeared to call in question the jurisdiction of the Court of King's Bench; for which he was again prosecuted by Bentley, and condemned to pay a fine of 50*l*.

Having lost his wife shortly after this, he travelled on the Continent, and spent some months in Rome in 1724. On his return to England, he renewed his suit against Bentley for the recovery of the four guineas, who at length paid the money to Middleton in 1725. In 1726 he published a short treatise 'De Medicorum apud veteres Romanos degentium Conditione Dissertatio; qua &c. servilem atque ignobilem eam fuisse ostenditur;' which was considered an insult upon the whole medical profession. Several pamphlets were published in answer to it, to which Middleton replied in the following year.

In 1729 Middleton published his celebrated 'Letter from Rome,' in which he attempted to show that 'the religion of the present Romans was derived from that of their heathen ancestors,' and that in particular the rites, ceremonies, dresses of the priests, &c. in the Roman Catholic church were taken from the pagan religion. This work was received with the greatest favour by the learned, and went through four editions in the author's life-time; but the free manner in which he attacked the miracles of the Roman Catholic church gave offence to many divines of his own communion, who suspected and maintained that the author had as little respect for the miracles of the apostles as for those of the Roman Catholic saints. This suspicion was confirmed by his next publication in 1731, which was a letter to Dr. Waterland, containing some remarks on Waterland's reply to Tindal's attack upon revealed religion, in a work written by the latter, which was entitled 'Christianity as old as the Creation.' This letter, which was first published anonymously, but was soon known to be written by Middleton, gave the greatest offence to the clergy. Pearce, bishop of Rochester, replied to it; and so strong was the feeling against Middleton, that he was nearly deprived of his degrees, and nearly degraded from his office of public librarian. Finding it necessary to make an explicit avowal of his sentiments with regard to religion, Middleton published, in 1732, 'Some Remarks on a Reply to the Defence of the Letter to Dr. Waterland, wherein the Author's Sentiments as to all the principal points in dispute are fully and clearly explained,' in which he expressly asserted his belief in Christianity, and disclaimed all intention of attacking the evidences of revealed religion. It must however be admitted that Middleton had spoken of the Scriptures in a manner that was calculated to give just cause of offence; and there is abundance of evidence in his writings to prove that he regarded Christianity in scarcely any other light than a republication of the law of nature, and that he endeavoured, like a certain class of modern divines in Germany, to reduce as far as possible everything supernatural in the Bible to mere natural phenomena. He expressly maintained that there were contradictions in the four evangelists, which could not be reconciled (*Reflections on the Variations found in the four Evangelists*); he accused Matthew 'of wilfully suppressing or negligently omitting three successive descents from father to son in the first chapter of his Gospel' (*Works*, vol. ii., p. 24, 4to. ed.); he asserted that the apostles were sometimes mistaken in their applications of prophecies relating to Christ (*Works*, vol. ii., p. 59); he considered the 'story of the fall of man as a fable or allegory' (*Works*, vol. ii., p. 131); and with respect to the prophecy given at the fall, that the seed of the woman should bruise the serpent's head, he did not hesitate to declare, in another part of his works (vol. iii., p. 183), 'that men who inquire into things will meet with many absurdities which reason must wink at, and many incredibilities which faith must digest, before they can admit the authority of this prophecy upon the evidence of this historical narration.' Such being the opinions of Middleton (and passages of a similar nature might be multiplied to almost any extent from his works), it cannot excite surprise that he should have been regarded by his brethren with suspicion, and have been looked upon, notwithstanding his assertions to the contrary, as a disbeliever in the fundamental doctrines of Christianity.

While these discussions were going on, Middleton was appointed to the professorship of natural history, which had been recently founded by Dr. Woodward, which appointment he resigned in 1734, and soon after married again. In the following year he published 'A Dissertation concerning the Origin of Printing in England,' showing that it was first introduced and practised by our countryman William Caxton at Westminster, and not, as is commonly supposed, by a foreign printer at Oxford. In 1741 he published by subscription his most celebrated work, 'The History of the Life of M. Tullius Cicero,' Lond., 2 vols. 4to. There were 3000 subscribers to this work, and the profits arising from its sale were so considerable, as to enable Middleton to purchase a small estate at Hildersham, six miles from Cambridge, where he chiefly resided during the remainder of his life. Middleton's 'Life of Cicero' is written, like all his other works, in a pleasing and perspicuous style; but the strong bias of the author in favour of his hero has frequently led him to become the panegyrist of very questionable actions, and even to misrepresent, perhaps not intentionally, those events which did not reflect credit on the character of his favourite. [CICERO, p. 158.] Dr. Parr, in a preface to a republication of Bellendenus, entitled 'De Statu,' asserts that Middleton, in his 'Life of Cicero,' borrowed very largely from a work of Bellendenus on the character, literary merits, and philosophical opinions of Cicero, which is entitled 'De Tribus Luminibus Romanorum.'

Two years afterwards, Middleton published a translation of Cicero's letters to Brutus, and of Brutus's to Cicero, with the Latin text, and a prefatory dissertation, in which he defended the authenticity of the epistles against the objections of Tunstall, who maintained that they were the composition of some sophist. The arguments of Middleton were combated by Markland in his 'Remarks on the Epistles of Cicero to Brutus, and of Brutus to Cicero, in a letter to a friend.' [MARKLAND.]

In 1745 he published 'Germana quædam Antiquitatis eruditæ Monumenta,' &c., in which he gave an account of the various specimens of antient art which he had collected during his residence at Rome. Two years afterwards he published his 'Treatise on the Roman Senate,' in which he maintained that all vacancies in the senate were filled up by the people; and in the same year he published 'An Introductory Discourse to a larger work, designed hereafter to be published, concerning the Miraculous Powers which are supposed to have subsisted in the Christian Church from the earliest ages,' which was followed in 1749 by 'A Free Inquiry into the Miraculous Powers,' &c. This work gave even more offence than his letter to Dr. Waterland; it was attacked by Dodwell, Church, and Chapman, and was generally condemned by the clergy as tending to destroy the authority of miracles in general. Middleton however disclaimed all such intention; and it must be allowed, that whatever may have been his private opinions, he does

not in this work advance anything which could fairly be construed into an attack upon revealed religion; perhaps the former controversy had made him more cautious. The object of the 'Free Inquiry' was to place the divines of his own church in the awkward predicament of either denying the authority of the fathers altogether, or else of admitting the truth of the leading doctrines of the Roman Catholic Church, which he maintains to be satisfactorily established by the testimony and miracles of the early fathers. Edward Gibbon, who was then a young man at Oxford, chose the latter alternative, and went over to the Roman Catholic Church, sooner than abandon the authority of the fathers. [GIBBON.]

In 1750 Middleton published 'An Examination of the Bishop of London's (Dr. Sherlock) Discourses concerning the Use and Intent of Prophecy,' in which he maintained that the use of prophecy, as it was taught and practised by Christ and his Apostles, was drawn entirely from single and separate predictions, gathered by them from the books of the law and the prophets, and applied, independently of each other to establish the Messiahship of Jesus, and that there was no foundation for Dr. Sherlock's argument that the prophecies of each age were intimately connected with each other and with those of the preceding age, and that the whole formed one connected series from the time of the antediluvians to the prophecies of Malachi.

Middleton died at Hildersham on the 28th of July, 1750. He accepted, shortly before his death, a small living from Sir John Frederick. His subscription to the thirty-nine articles and the canons of the church on that occasion was represented by his enemies, but whether justly or not it is difficult to say, as hypocritical and insincere.

The works of Middleton, with the exception of his 'Life of Cicero,' were collected and published after his death in four volumes, 4to. 1752, and subsequently in five volumes, 8vo. Several treatises appeared in this collection which had not been published before, of which the most important are:—'A Preface to an Intended Answer to all the Objections made against the Free Inquiry;' 'Some cursory Reflections on the Dispute or Dissension which happened at Antioch between Peter and Paul;' 'Reflections on the Variations or Inconsistencies which are found among the Four Evangelists;' 'An Essay on the Gift of Tongues;' 'Some Short Remarks on a Story told by the Antients concerning St. John the Evangelist and Cerinthus the Heretic;' and 'An Essay on the Allegorical and Litteral Interpretation of the Fall of Man.'

MIDDLETON, THOMAS FANSHAW, D.D., the first English bishop of Calcutta, was the only son of the Rev. Thomas Middleton, rector of Redleston, in Derbyshire, and was born at that village on the 26th of January, 1769. In 1779 he was admitted into Christ's Hospital, London, and from thence he proceeded to Pembroke Hall, Cambridge, where he took his degree of B.A., with honours, in Jan., 1792. In the following March he received ordination, and entered upon the curacy of Gainsborough, in Lincolnshire Here he edited a periodical work, entitled the 'Country Spectator,' which continued to appear for about seven months, and most of the papers in which were written by Mr. Middleton himself. In 1794 he became tutor to the two sons of Dr. John Pretyman, archdeacon of Lincoln, and brother of the bishop. In consequence of this appointment he removed, first to Lincoln, and afterwards to Norwich, where he became curate of St. Peter's Mancroft in 1799, having already, in 1795, been presented by Dr. Pretyman to the rectory of Tansor, in Northamptonshire. In 1797 he married Elizabeth, the eldest daughter of John Maddison, Esq., of Gainsborough. This lady not only brought him a great increase of domestic happiness, but also assisted him in his literary labours, by transcribing all his manuscripts for the press. In 1802 Dr. Pretyman presented him to the rectory of Bytham, in Lincolnshire. About this time he wrote his chief work, 'The Doctrine of the Greek Article, applied to the criticism and illustration of the New Testament,' which he published in 1808, with a dedication to Dr. Pretyman. In the same year he took his degree of D.D. at Cambridge, and removed to his living at Tansor, where he discharged his duties in such a manner as to gain the affection and esteem of his people. In 1809 he was appointed by Bishop Pretyman to a stall in the cathedral of Lincoln, and in 1812 to the archdeaconry of Huntingdon. In 1811 he resigned his two livings for the vicarage of St. Pancras, Middlesex, and the rectory of Rottenham, in Hertfordshire. He fixed his residence at St. Pancras, and made the acquaintance of several dignitaries of the church and other distinguished individuals.

About this time a provision was inserted in the Act for the renewal of the East India Company's Charter, enabling the crown to constitute a bishopric in India. Calcutta was forthwith made a bishop's see, and Dr. Middleton was appointed the first bishop, and consecrated by the archbishop of Canterbury on the 8th of May, 1814. After receiving an address from the Society for the Promotion of Christian Knowledge, of which he was a warm supporter, requesting his aid in promoting the objects of the Society in India, and after being elected a fellow of the Royal Society, Bishop Middleton sailed on the 8th of June, and arrived in Calcutta on the 28th of November, after a voyage which he had diligently employed in increasing his qualifications for his office, especially by the study of Hebrew and Persian. As bishop of Calcutta he made every effort to promote the interests of Christianity according to the tenets of the Church of England, and to aid the cause of education. He made three visitations of his immense diocese, in two of which he directed his particular attention to the state of the Syrian Christians in the neighbourhood of Cochin, on the coast of Malabar. By his efforts the Bishop's College at Calcutta was established for the education of clergymen and missionaries for the British possessions in Asia; and he laid the first stone of its buildings on the 15th of December, 1820. He instituted a consistory court at Calcutta, and would have done the same at Madras, but for the opinion of the advocate-general at Madras that such a measure would be illegal.

Bishop Middleton died of a fever on the 8th of July, 1822, in the fifty-fourth year of his age. He was buried at Calcutta, and the greatest respect was shown to his memory both in India and at home. He was of a tall and commanding person; animated in his manner; sanguine, generous, and amiable in his disposition; and, in his religious principles, firmly attached to the Church of England. As all his papers were destroyed by a direction in his will, none of his works have appeared besides the 'Doctrine of the Greek Article,' the periodical publication mentioned above, and some sermons, charges, and tracts, which have been collected into a volume, to which a memoir of Bishop Middleton is prefixed, by H. K. Bonney, D.D., archdeacon of Bedford (Lond., 1824).

The object of Bishop Middleton's work on the Greek article is, first, to establish the rules which govern the use of the article, and then to apply these rules to the interpretation of various passages in the New Testament, many of which are of such a nature that they furnish arguments for or against the divinity of Christ, according to the different views which are taken of the force of the article. Owing to this circumstance the doctrine of the Greek article has become the subject of warm discussion among theologians; and some Unitarian divines have strongly opposed the views of Middleton. His chief rules have however been received as sound by the great majority of biblical critics. A second and improved edition of Middleton's work was edited by Professor Scholefield in 1828, and a third edition by the Rev. Hugh James Rose, 1833. An abstract of the work is prefixed to Valpy's edition of the Greek Testament.

MIDDLEWICH. [CHESHIRE.]

MIDHEAVEN (Astronomy), a technical term for the point of the ecliptic which is on the meridian at any given moment.

MIDIANITES (מִדְיָנִים, Μαδιανῖται, Μαδιηναῖοι), the descendants of Midian, the son of Abraham by Keturah (*Gen.*, xxv. 2, 4), who, with the other sons of Abraham's concubines, migrated eastward from Canaan during Abraham's life (*Gen.* xxv. 6). In the time of Jacob their merchants had caravans from Gilead through Palestine to Egypt (*Gen.*, xxxvii. 28, 36). In the time of Moses we find them in Arabia Petræa, under the government of a high-priest (*Exod.*, ii. 15), and leading their flocks as far as Mount Sinai (*Exod.*, iii. 1); but they did not extend to the west of this mountain, for the Israelites did not come in contact with them in their march from Egypt, but, on the contrary, Jethro, their high-priest, came out of his country to visit Moses, when the Israelites were encamped at the foot of Sinai (*Exod.*, xviii. 1-5; *Numb.*, x. 29). They are next mentioned as living in the neighbourhood of the plains of Moab, to the east of the Dead Sea and the river Jordan,

where they suffered a defeat from the Edomites (*Gen.*, xxxvi. 35), and where they again appear as allies of the Moabites when the Israelites arrived the second time on the borders of Palestine (*Numb.*, xxii. 4). Here they corrupted the Israelites with the licentious worship of their god Baal-peor, and were punished by a dreadful massacre (*Numb.*, xxv. xxxi.; *Josh.*, xiii. 21). This calamity however fell only upon a part of the nation, for they afterwards, with the Amalekites and other eastern tribes, invaded the country of the Israelites, and destroyed the harvests, during seven successive years (*Judges*, vi. 1-3, 33). At last Gideon (*Judges*, vi. 11) defeated the Midianites and Amalekites in the plain of Jezreel, and pursued them beyond the Jordan (*Judges*, vi. 33; vii. viii.). In the time of Isaiah, the Midianites were still known as a commercial tribe (*Is.*, lx. 6), but their name afterwards merged in that of the Arabians.

The exact country of the Midianites is not determined with certainty. Some indeed suppose that those in Arabia Petræa, mentioned in *Exodus*, ii. 15, were quite a different nation from those on the east of Palestine, the former being related to the descendants of Cush (*Numb.*, xii. 1; *Hab.* iii. 7). But the more common and more probable opinion is, that the Midianites were an Arabian nomade tribe, whose possessions extended from Mount Sinai and the head of the Red Sea up towards the plains of Moab, while there may have been other bodies of them in the western part of Arabia (1 *Kings*, xi. 18). The Arabian geographers Abulfeda and Edrisi mention a town, Madian, on the eastern side of the Ælanitic gulf of the Red Sea, somewhat to the north of the modern Moilah, which is probably the Μήδιανα of Ptolemy (v. 17) and the Μαδιανή of Josephus (*Ant.*, xii. 11, 1), and of which the ruins were to be seen in the time of Eusebius and Jerome.

The Midianites were governed by their elders (*Numb.*, xxii. 4), and by chiefs or kings (*Numb.*, xxv. 15, 18; xxxi. 8; *Judges*, vii. 25; viii. 3, 5). When they invaded Palestine they were very numerous; they possessed many camels, and had acquired great wealth, probably by commerce (*Judges*, vi. 5; vii. 12; viii. 10, 24; *Is.*, lx. 6). Their religion was the worship of Baal-peor. [BAAL.]

They are twice called Ishmaelites (*Gen.*, xxxvii. 28; *Judges*, viii. 24), which is a proof of their close connection with the Arabians. (Relandi, *Palæstina*, 98; Winer's *Biblisches Realwörterbuch*.)

MIDSHIPMEN are young gentlemen ranking as the highest of the first class of petty officers on board a ship of war: their duty is to pass to the seamen the orders of the captain or other superior officer, and to superintend the performance of the duties so commanded. They are educated for their profession at the Royal Naval College, and are required to complete two years service at sea before they can be rated. Such as are appointed by the special authority of the Lords Commissioners of the Admiralty are denominated Admiralty midshipmen.

By the regulations of 1833, the whole number allowed to be entered on board a ship of war varies according to the rate of the latter; a sixth-rate ship may have eight, and a first-rate may have twenty-four midshipmen. And, on a ship being put in commission, the captain or commander may select them from the Royal Naval College, subject however to the approbation of the lords of the admiralty.

Should there be more Admiralty or College midshipmen than can be provided for, their lordships may give appointments, as extra-midshipmen, to two at most for any one ship; these must be in the places of an equal number of seamen, and they are included in the complement of midshipmen when vacancies occur.

The monthly pay of an officer of this class is 2*l.* 8*s.* for ships of all rates.

MIDSUMMER EVE. On the eve of the feast of the Nativity of St. John the Baptist, or Midsummer-day, it was long the custom to kindle fires at midnight, sometimes upon the hills, in honour of the summer solstice; a practice which Gebelin, in his 'Allegories Orientales,' says was followed among the antient nations. In later times these were sometimes called St. John's fires; and they are still lighted in Ireland. The 'Times' newspaper of June 29, 1833, contains an account of a riot at Cork in consequence of some soldiers refusing to subscribe money toward the fires which were to be lighted on St. John's Eve.

(Brand's *Popul. Antiq.*, 4to. ed., vol. i., p. 238; Milner's *Inquiry into certain Vulgar Opinions concerning the Catholic Inhabitants and the Antiquities of Ireland*, 8vo., Lond., 1808, p. 100; Vallancey, *Collect. de Rebus Hibern.*, No. I., p. 123.)

MIEL, JAN (called GIOVANNI DELLO VITE), one of the most eminent of the Flemish artists, was born in 1599. He studied under Gerard Segers, in whose school having highly distinguished himself, he went to Rome, where he especially studied and copied the works of the Caracci and Correggio. On being received into the academy of Andrea Sacchi, he gave such proofs of extraordinary genius, that Sacchi invited him to assist him in a grand design which he had already begun. But in consequence of some disgust, the cause of which does not appear, Miel abandoned the elevated subjects which had hitherto engaged his attention, declined the friendly proposal of Sacchi, and resolved to adopt the style of Bamboccio, to whom he is nowise inferior in force or brilliancy. His favourite subjects were holiday parties, carnivals, gipsies, beggars, and pastoral scenes and persons. We speak of his easel pictures, which are his finest performances; but he likewise painted historical pictures on a large scale, both in fresco and oil, which, though wanting in elevation of design and grace in the heads, are far superior to what might be expected from an artist whose subjects were in general of so much lower a class. His pictures of hunting-parties are particularly admired; the figures and animals of all kinds are designed with extraordinary spirit and truth to nature; the colouring is beautifully transparent, and the tints of his skies are extremely clear and delicate. His great merit procured him the favour of Charles Emanuel, duke of Savoy, who appointed him his principal painter, conferred on him the order of St. Mauritius, and presented him with a cross set with diamonds of great value. There are many capital pictures by this artist in the imperial gallery at Vienna; and in a grand saloon in the hunting seat at Turin there is a series of his noblest productions, representing the chace of various kinds of animals.

MIERIS, FRANCIS (called the Elder), was born at Leyden in 1635. This admirable artist was at first placed under the care of Abraham Toorne Vliet, one of the best designers in the Low Countries; and after having made considerable progress under him, he became a pupil of Gerard Douw. He soon so far surpassed all his fellow students, that Gerard Douw called him the prince of his disciples. He excelled Douw in elegance, in correctness and brilliancy of colouring, and in the art of painting silk, velvet, satin, and other rich stuffs, and was nearly equal to him in finish. His works are rarely to be seen, and more rarely to be sold, and their prices are very high. Besides portraits, he painted conversations, persons performing on musical instruments, patients attended by their physician, &c. His own price for his pictures was calculated according to the time he spent upon them, at the rate of a ducat an hour. His finest portrait is that of the wife of M. Cornelius Plaats, in whose family it was carefully preserved, according to Pilkington, though very large sums had been offered for it. Some of his pictures are in the Florence Gallery. He died in 1681, aged forty-six.

MIERIS, WILLIAM (called the Younger), the son and disciple of Francis, was born at Leyden in 1662. He had made considerable progress during the life of his father; but having lost him when only nineteen years of age, he devoted himself to the study of nature. His first subjects were taken from private life, like those of his father, in which every part was copied minutely after nature. He afterwards attempted historical compositions, and his first performance of this kind was Rinaldo asleep on the lap of Armida, surrounded by the Loves and Graces, which was so highly admired, that he was prevailed upon to paint three repetitions of the same subject. He likewise painted landscapes and animals; and was so admirable a modeller in clay, that he might be ranked among the most eminent sculptors. He was inferior to his father in design, grouping, and effect; nor has he the same exquisite touch. His finishing is extremely delicate, and almost over-careful. He died in 1747, at the age of eighty-five, equally esteemed as a man and an artist. The above account is taken from Pilkington and others; but Dr. Waagen is much less favourable in his opinion: he says, 'The degeneracy of Dutch painting into mere mechanical industry, without spirit, was manifested, in all its dull sameness, in this master, most of whose works are extremely disagreeable to me.'

MIERIS, FRANCIS (called the Young Francis), was the son of William, but much inferior to him. He made

numerous copies of the works of his father and grandfather, and it is probable that such copies are put off at public sales as their performances. He is more distinguished as an historian, by his 'Historie der Nederlandsche Vorsten,' 3 vols. fol., the Hague, 1732-5; and 'Groot Charterboek der Graven van Holland, Zeeland, en Vriesland,' 4 vols., Leipzig, 1753-6. The history of his native town Leyden was left unfinished, one volume only having been published. He died in 1763, aged seventy-six.

MIGNARD, PETER (called the Roman), was born at Troyes in 1610. His name was properly More; but his father, who was of English origin, took the name of Mignard. He was at first intended for the medical profession; but as he manifested a decided talent for painting, his father placed him in the school of Jean Boucher, at Bourges, and afterwards in that of the celebrated Vouet. Having seen some capital paintings of the Italian masters, he left Vouet and went to Rome, in 1636, to study after Raphael, Michael Angelo, and A. Caracci. He spent twenty-two years at Rome, during which time he painted many historical pictures and portraits, among which those of popes Urban VIII. and Alexander VII. were the finest. In 1658 he was invited to Paris at the suggestion of Colbert, and, on his way through Italy, had the honour of painting the portraits of several of the Italian princes and their families. In France he acquired the favour of Louis XIV., who sat to him for his portrait ten times, and gave him a patent of nobility; and after the death of Le Brun, appointed him principal painter, director of the Royal collections of the Academy of Painting, and of the Gobelin manufactory. Mignard executed one of the greatest works in fresco in France, the cupola of Val de Grace. He also adorned the great hall at St. Cloud with mythological subjects, undertook several works at Versailles, and painted numerous portraits. Though Mignard was far inferior to the great models that he studied at Rome, in invention, elevation, depth of feeling, and originality, his pictures, especially his Madonnas, have much delicacy and grace; his compositions are rich; his colouring, in general, is brilliant and harmonious; and he unquestionably is in the first rank of the painters of the French school. He died in 1695, at the age of eighty-five. Nicholas Mignard, Peter's brother, two years older, was a very respectable artist: he studied two years at Rome with Peter. He died at Paris in 1668, where he was director of the Royal Academy of Painting.

MIGUEL, SAN. [MEXICAN STATES.]

MIHIEL, ST. [MEUSE.]

MILA'NO, THE PROVINCE OF, is bounded on the north by the province of Como, on the east by that of Bergamo (from which it is divided by the Adda), on the south by the provinces of Lodi and Pavia, and on the west by the Ticino, which separates it from the Sardinian territory. The province of Milan is entirely in the great plain of Lombardy, and is watered by the Lambro, the Olona, and other affluents of the Po. Numerous canals, some for irrigation and others for navigation, communicate with these various rivers. The soil is in most parts fertile, and the country is well cultivated, full of large villages, farm-houses, and country-houses; and the appearance of prosperity is general. The chief products are corn, rice, fruit, grass for cattle, and silk. The population of the province, exclusive of the city of Milan, in 1837, consisted of 377,324 inhabitants, and is increasing every year. The province is divided into fifteen districts: Milano, Bellate, Saronno, Barlassina, Monza, Verano, Vimercate, Gorgonzola, Gallarate, Cuggiono, Busto, Arsizio, Soma, Melzo, Melegnano. The only town, besides Milan, is Monza, ten miles north-east of Milan, with about 10,000 inhabitants, and a fine old cathedral founded by the Longobard queen Theodelinda: it contains several good paintings, and the portraits of all the sovereigns who have worn the iron crown of Lombardy, from Agilulphus, the husband of Theodelinda, to Charles V. The iron crown, so called because it contains an iron rim which is said to be made of one of the nails from the cross of Jesus Christ, is kept in the cathedral of Monza. The archives contain many valuable old documents, and some fine MSS. of the time of Pope Gregory I. Monza has also a handsome royal palace, with a vast park and gardens. The neighbourhood of Milan contains many other fine country residences belonging to the Milanese nobility and landed gentry; among others Omate, Leinate, Castellazzo, Gerniettо, Villa Traversi near Desio, and Montebello. This last is memorable from having been the head-quarters of Bonaparte after the campaign of 1797, and during the negotiations which preceded the peace of Campoformio. It was at Montebello that he decreed the destruction of the republic of Venice. The roads in the province of Milan are numerous, wide, and kept in excellent repair.

MILA'NO, the capital of Lombardy, and the third city of Italy, being next to Naples and Rome in population and importance, stands in the midst of a vast plain, between the rivers Olona and Lambro, with which it communicates by a canal called Naviglio Grande, which flows all round the original old town, of which it marks the boundary. This Naviglio and another canal called Naviglio di Martesana put Milan in communication with the Lago Maggiore and the Lake of Como on one side, and with the Po on the other. The suburbs, which have been gradually built outside of this boundary, and which occupy more space than the original city, are enclosed and surrounded by a line of ramparts, which is planted with trees, and serves as a promenade. This external circuit of the town is nearly ten miles. Much of the space however between the Naviglio and the ramparts is not built upon, and is occupied by gardens and fields. The population of Milan, in 1837, was 145,387. (*Bollettino Statistico.*) In 1770, when the abbé Richard wrote his tour, it did not amount to 100,000. In 1810, under Napoleon, it was 132,000. In 1816, after the change of government, it fell to 129,000, since which time it has been increasing yearly. The widest and finest streets of Milan are in the external part of the town, or suburbs: those which lead to the principal gates are called Corso, and serve as fashionable promenades. The Corso di Porta Orientale, which leads to the Bergamo road, is the most frequented. The streets of the old town are mostly narrow and irregular. The duomo, or cathedral, stands nearly in the centre of the town, and its lofty spire, which is seen from almost every part of it, serves as a directing point to strangers. This magnificent building, all of white stone, and dedicated to the Virgin Mary, was begun by Giovanni Galeazzo Visconti, duke of Milan, in March, 1386, and is not yet quite finished. The exterior, with its hundred spires and its three thousand statues of various sizes, looks like a forest of marble. The style of architecture is a kind of florid or modern Gothic; the front is of a mixed style. The interior is vast and imposing, and not loaded with ornaments. There are 520 steps to ascend, in order to reach a gallery which runs round the principal spire, from which there is a most splendid view of the whole Lombard plain, and of the chain of Alps which borders it in the form of a crescent on the north side. The churches of Milan abound with fine paintings: the famous Lord's Supper, by Leonardo da Vinci, in the refectory of the former convent of Santa Maria delle Grazie, though sadly injured, is not yet quite obliterated.

Milan is a gay, thriving, modern city: its markets are abundantly supplied with every luxury, and the citizens are generally fond of good living. Numerous coffee-houses, splendid hotels, abundance of handsome carriages, elegantly dressed pedestrians, several theatres well supplied with actors and singers,—all attest the habits of a luxurious capital. Milan has been styled 'the little Paris;' and the appellation is appropriate, for it resembles that capital rather than the other Italian cities. But Milan is also a centre of learning: it is the place of residence of several of the best Italian writers, and more books are published yearly at Milan than in all the rest of Italy. Gioja, Romagnosi, and Monti made Milan their habitual residence; Manzoni, Grossi, Sacchi, and other living writers still reside in it. The fine arts are successfully cultivated at Milan, as the annual exhibition of the works of living artists proves. The engravers Longhi (lately dead), Anderloni, and others rank among the first in Italy. The museum of Brera contains several excellent paintings of the great masters; among others the Agar of Guercino, the Marriage of the Virgin by Raphael, and St. Peter and Paul by Guido. The Ambrosian library is well known for its numerous and valuable MSS., and especially for its palimpsests, derived from the monastery of Bobbio, and among which Mai discovered the treatise 'De Republica' of Cicero, fragments of several of his lost orations, the letters of Marcus Aurelius and Fronto, and other valuable remains of antient literature. The library of Brera contains 100,000 volumes, and is open to the public. Among the private libraries, that of the marquis Trivulzio contains 30,000 printed volumes and 2000 MSS.

Milan abounds with charitable institutions. The great hospital, one of the finest and largest in the world, has been richly endowed by numerous benefactors, whose portraits are preserved within it. A singular but harmless distinction has been observed in these portraits. Those benefactors who have contributed below a certain sum are represented standing, whilst those whose donations or legacies have been more considerable are painted sitting comfortably at their ease. Four houses of refuge for poor children are supported by public contributions. Two large workhouses for the unemployed poor have been established of late years, as well as a house of correction for criminals, who are employed in useful labour, and which is said to be admirably well regulated. (*Bollettino Statistico di Milano*, January, 1833.) Milan has a savings'-bank, the deposits in which are between five and six millions of livres, or above 200,000*l.* sterling, an insurance company, a military college, a veterinary school, a conservatorio or school of music, and a school of the fine arts. For general education, there are two royal colleges or Lycea, three gymnasia, a clerical seminary, and three colleges or houses for female education. The elementary schools are noticed in the article LOMBARDO-VENETIAN KINGDOM. The Society of Arts and Sciences bestows annual prizes for inventions relating to agriculture and manufactures.

The manufactures of Milan are of some importance: they consist chiefly of silks, printed cottons, plate-glass, jewellery, artificial flowers, braid, soap, and leather.

Milan is an archbishop's see, the residence of the Austrian viceroy and of the governor-general of the Lombard provinces. It has a court of appeal, a tribunal of prima istanza for civil and another for criminal matters, and a commercial tribunal, called 'Tribunale mercantile e di Cambio.'

The public gardens, the ramparts, the great parade, which occupies the site of the old citadel, and the several avenues planted with trees which lead from the gates in various directions, afford pleasant walks and rides. The climate of Milan is hot in summer, but occasionally cold and foggy in winter: it is however considered healthy.

The Circo, or modern amphitheatre, built in the time of the French dominion, for the exhibition of chariot and horse races, bull-fights, and other games, is of an oval form. The arena, which is about 800 feet in length, can be filled with water, and be transformed into a naumachia for boat-races.

The Duomo and La Scala theatre have so completely absorbed the attention of travellers, that few of them have done more than barely mention any of the other edifices, notwithstanding that Milan contains several which deserve examination on account of their architecture. Even Woods, in his 'Letters of an Architect,' speaks only of some of the older churches, scarcely naming any one building besides, or any work of the last or present century, the theatre of La Scala, and the Arco della Pace itself, not excepted. Notwithstanding the imposing grandeur of some of the older palazzi, or private mansions, and the elegance of some of the modern ones, neither the one nor the other have been described, or rather they have scarcely been named; and yet among the former are the Palazzo Arcivescovile, with its façade of simple grandeur, the Palazzo Visconti, remarkable for the series of large busts on the pediments of the principal floor windows; the Palazzo Annone, by Francesco Richini, in a rather peculiar yet majestic style; the Palazzo Marini, now the Palazzo di Finanza, the work of Galeazzo Alessio, which, although impure in taste, and too much crowded, is an exceedingly rich and picturesque as well as extensive pile of building, whose principal façade exhibits three orders, a Doric, an Ionic (in pilasters), and one consisting of fluted termini, surmounted by masks or busts for their capitals. Among the more recent structures of this class is the Palazzo Belgioioso, by Giuseppe Piermarini (who died 1798), the architect of the Teatro della Scala, the Monte or public bank, and various other edifices; the Villa Belgioioso, by the architect Leopoldo Pollak (died 1800); and the Palazzo Belloni, the work of the celebrated Cagnola, who likewise erected the magnificent marble triumphal arch called the Arco della Pace. Somewhat akin to this last-mentioned structure are several of the arches or gateways forming the entrances into the city. Among these the most remarkable in point of design is the Porta Ticinense, or di Marengo, a classical propylæum of the Ionic order, presenting a double distyle in antis, that is, one in each front, connected by lateral walls, each pierced by a single plain arch. This also was designed by Cagnola. The Porta Nuova, by the architect Zanoja, who died in 1817, and who is known also as a poet, is a very tasteful design, and one that shows considerable originality. The Porta Orientale again, with the adjoining buildings as completed a few years since by Vantini, makes a rich architectural display. Yet, with the exception of the Duomo, not one of these edifices, not even the gorgeously-picturesque façade of Santa Maria presso San Celso, the work of Galeazzo Alessio, nor the more refined elegance which stamps many of the buildings by Cagnola, Zanoja, Pollak, Gilardoni, and other modern architects, has been described by the pencil of any of our English artists, who seem to have visited Milan for no other purpose than that of delineating what is as familiar to us from prints as our own St. Paul's.

The Arco della Pace calls for more particular notice, as being one of the most splendid public embellishments of Milan, and, after the Arc de l'Etoile at Paris, the most important monument of the kind erected in modern times; likewise as being the principal work of its architect, the Marchese Luigi Cagnola, by whom it was commenced in 1807, and carried on until his death, August 10, 1833, after which it was continued by Carlo Londinio, and finally completed in 1837. It stands on the north-west side of the city, where it forms the entrance from the road of the Simplon into the spacious Piazza d'Armi, and is not only completely insulated, but so situated as to be seen to the utmost advantage from every point of view, particularly as regards its two principal fronts, one of which faces the noble avenue above mentioned, and the other, or that towards the city, is viewed between two elegant Doric marble buildings (serving as guard and toll houses), which are placed a little in advance of it, and are about three times the breadth of its front apart from each other. The arch, which is entirely faced with marble, and highly enriched in every part with reliefs and sculptures, besides statues both upon and in front of the attic, forms an architectural mass whose general dimensions are 72½ feet English, by 42½ in depth, and 74 in height, or including the sestiga and statue on its summit, the extreme height is 98 feet. Each of the principal fronts exhibits four fluted Corinthian columns, with half-columns behind them, and between them a centre arch (24 feet wide and 48 high) and a smaller one (10 feet 9 inches wide and 28 feet high) on each side of it. The entablature (the frieze of which is enriched throughout with figures of genii holding festoons) is not made to break over each of the columns, as in the triumphal arches of antiquity, neither is it continued unbroken throughout, as is the case in the arch in the Green Park, London, but it forms only a single projecting break on each side of the centre, whereby the inconvenience is avoided of such a mass of stone being suspended over the wider centre intercolumn. This disposition of the entablature has led to another novelty in the design, for instead of a statue being placed over each column, a single recumbent one, of larger dimensions than would else be suitable, is placed on these projecting entablatures. Those on the side towards the city represent the rivers Ticino and Po, on the other the Adige and Tagliamento, the two former of which were executed by Cacciatori, and the latter by Pompeo Marchesi.

There is some peculiarity in the plan of the Arco della Pace, there being no transverse passage through it from end to end, as in the Arc de l'Etoile, but merely an opening through the piers separating the larger arch from the one on each side of it, owing to which the external sides or ends of the structure have the expression of greater solidity. At each angle of the attic is a bronze equestrian statue of Victory, about thirteen feet high; and on the side towards the city the centre is crowned by a colossal figure of Peace (modelled by Sangiorgio, and cast in bronze by Luigi and Antonio Manfredini) in a car with six horses. Further than this neither description nor enumeration can be given of the various other sculptures and reliefs that so worthily adorn this magnificent work.

Milan, under the name of Mediolanum, was a town of the Cisalpine Gauls, and is mentioned by Livy (v. 34) and Polybius (b. xi.). It was taken by the consuls M. Marcellus and C. Cornelius Scipio, B.C. 221. Little is said in history of Milan afterwards until the end of the third century of our æra, when Maximianus, the colleague of Diocletian, fixed his residence at Milan, and surrounded it with walls,

which were two miles in circumference, and which continued to enclose the area of the town till the time of Frederic I., in the twelfth century. Valentinian II., Theodosius I., Honorius, and other emperors of the fourth and fifth centuries, resided occasionally at Milan. At the fall of the Western empire, Milan was twice devastated, once by Attila, and afterwards by the Goths under Vitiges, A.D. 539, and it did not recover from their ravages for several centuries after. The Longobard kings had their residence at Pavia, and Milan is little noticed in history during their dominion. It remained in obscurity till the latter part of the ninth century, when, under the reign of the emperor Charles the Fat, the archbishop Anspertus restored the walls built by Maximianus, and thus gave security to the inhabitants. From that time Milan recovered, and grew in population and wealth, and became gradually the principal city of Lombardy. The remainder of its history is given under LOMBARDY and LOMBARD CITIES. The present city of Milan has no claims to classical antiquity, the only solitary remains of Roman construction being sixteen handsome fluted pillars near the church of S. Lorenzo, which are supposed to have formed part of a temple dedicated to Hercules by Maximianus.

The history of Milan has been written by Corio, Ripamonti, Calco, Giulini, and lastly by Verri, who is the most critical and enlightened of the native historians, 'Storia di Milano,' with a continuation by Custodi, 4 vols. 8vo., 1825. Argelati has written the literary history of Milan, 'Bibliotheca Scriptorum Mediolanensium,' 4 vols. fol., 1745. Pirovano has published a description of Milan, 'Nuova Guida di Milano, coi suoi Stabilimenti di Scienze, di Pubblica Beneficenza ed Amministrazioni, Chiese, Palagi, Teatri,' &c., 1824. Numerous other authors have written upon particular buildings and other subjects relative to this important city. See also the *Plan of Milan*, published by the 'Society for the Diffusion of Useful Knowledge.'

MILDEW is a disease which attacks both living and dead vegetable matter, and is believed by the vulgar to be owing to fogs, dew, meteors, and noxious exhalations, but in reality is caused by the ravages of parasitical fungi. This malady is often of little importance to the subjects of its attack, as it appears towards the close of the year, when the most essential of the vital functions of plants are fulfilled, or in such a small degree as to produce no appreciable effect upon the general health of the plants infested. But it very often becomes a most serious evil, destroying the straw of corn, and so preventing the maturation of the grain, ravaging the fields of peas and beans, destroying the hopes of the gardener by seizing upon his peaches and nectarines, especially when forced, and not unfrequently extending its evil influence to the orchards and every description of kitchen-garden crop.

The species of fungi which produce these effects are always very minute, and often of microscopic smallness. Some are intestinal, attacking plants internally, and only becoming visible when they break through the surface of the plant for the purpose of shedding their spores; others are superficial, rooting and fructifying upon the outside of the epidermis. These two classes of mildew fungi require to be carefully distinguished.

Of the *intestinal* fungi the following are the more common, viz.:—

1. *Uredo fœtida*, called the Pepper-brand. This plant attacks wheat, filling the young seed with its jelly-like spawn, and producing myriads of fœtid deep brown spores, which end by occupying the whole interior of the ripe grain.

2. *Erineum griseum*, and other species of the same genus, which overrun the leaves of the mountain ash, the sycamore, &c., forming broad grey, orange, or brown blotches.

3. Various kinds of *Puccinia*. The mildew of wheat-straw is caused by *Puccinia graminum*, which is generated in cavities below the epidermis of the stem, and protrudes when ripe in the form of dull greyish-brown broken striæ. *Puccinia Heraclei* occasionally attacks crops of celery and endive, spreading over the field and producing the appearance of scorching.

4. *Æcidium cancellatum* occasionally does much harm to pear-trees in the orchards of Herefordshire. It appears at first like bright yellow spots upon the upper surface of the leaves; by degrees a liquid matter is exuded from them; at the same time small conical processes appear in clusters from the under side of the leaf; these processes enlarge, become fibrous, open at the sides by numerous slits, and thence discharge their spores. This fungus often produces the most destructive consequences, appearing upon the leaves, stems, and fruits, and generally destroying the tree. Another species, *Æcidium laceratum*, sometimes spreads over hawthorn hedges; and the common orange-red mildew of the Berberry is *Æcidium Berberidis*.

5. *Sclerotium*, a hard kernel-like fungus, is a less common but sometimes very troublesome visitor. *S. compactum* occasionally establishes itself in the rind of fruits, rendering them uneatable; *S. Cyparissiæ* and others attack the leaves of various plants, particularly of the pear-tree.

In all these cases it is usually found that the most vigorous individuals are the first affected by the mildew, especially in the case of Uredo and Puccinia; and it is probable that the spores from which these plants are propagated are drawn into the circulation from the soil, along with the fluid matter on which plants feed; that they are carried along into the stem, and begin to grow as soon as they find themselves in a suitable situation, disturbing and disorganising the tissue by the production of their spawn, and taking to themselves that nutriment which would otherwise have been applied to the general maintenance of the plant attacked. Mr. Bauer found that he could always cause wheat to produce the Uredo fœtida by rubbing its grains with the spores of that fungus previous to their being sown; and Mr. Knight ascertained that by sowing pear-seeds in soil infested with the Æcidium, the very youngest leaves of the seedling plants were attacked.

Of *superficial* fungi the following are the most remarkable:—

1. *Cylindrosporium concentricum*, a pulverulent species, which appears in dots arranged in a circular manner upon the leaves of the cabbage.

2. *Acrosporium monilioides*.—A frequent cause of the whiteness of leaves and stems in roses, &c. It consists of vast multitudes of filaments jointed like a necklace.

3. *Botrytis diffusa* and species of the genus *Aspergillus*, whose filaments bear tufts or branches, covered with spores. These form the white mealy appearance of the leaves of onions and similar soft-leaved plants.

4. *Erysiphe communis*, which forms the mildew of peas. It consists of white cobweb-like spawn, radiating from a solid grey spherical centre, filled with the spores of the species. Peach mildew is often caused by another of this genus, the *E. pannosa*.

The attacks of superficial fungi are generally brought on by the debility of the species attacked; and it is probable that unhealthy individuals only are suited to the growth of these parasites. This is like what occurs among animals, which, when healthy, are scarcely attacked by parasitical vermin, but as soon as they become sickly are overrun by them. Heavy rains occurring suddenly after long drought are mentioned as a cause of this kind of mildew; and it may be supposed that the plants are debilitated by the dry weather, at which time the fungi seize upon them, and that as soon as rain falls they grow with rapidity and quickly overrun the plants. It is said that deep-coloured roses and peaches are more liable to mildew than others; this may be referred to constitutional debility, for their colour is connected with a want of power to decompose carbonic acid, which is one of the most indispensable of vital functions in the vegetable kingdom. Transplanted onions, which are less vigorous than untransplanted ones, are the most subject to mildew.

These causes of mildew being rightly understood, the methods of preventing the evil are sufficiently obvious. To cure intestinal mildew the soil should be neither too rich nor too freely watered, and every precaution should be taken to prevent the spores of the mildew-plants from being communicated to the soil. Mr. Knight stopped the attacks of *Æcidium cancellatum* by taking up his mildewed pear-trees, washing their roots clean, pruning them closely, and removing them to a new situation; those removed became healthy, those left in the soil eventually perished. It would also appear that in some cases plants may be rendered incapable of taking the mildew. Mr. Bauer says that if corn attacked by pepper-brand is soaked in lime-water for at least 12 hours and then well dried in the air, before sowing, not only are all the fungi adhering to it destroyed, but the plants themselves are incapable of nourishing the fungus; at least he found that prepared grains could not be inoculated, although unprepared grains could be. With

regard to destroying superficial mildew, a restoration of vigour or its preservation seems to offer the best chances of success. Mr. Knight prevented his peas from mildewing by watering them abundantly and constantly; in Scotland, where the climate is more equable than in England, and the night dews more abundant, pea mildew is unknown; the writer of this has seen a crop of onions, perishing under the attacks of Botrytis diffusa, gradually restored to health by a constant supply of water. As to the schemes of stopping superficial mildew by the application of sulphur, quick-lime, fresh wood-ashes, and similar substances, all of which have been recommended, it does not appear that any advantage follows their employment. When trees are attacked by superficial parasites, the best plan of removing the evil is by cutting off all the mildewed branches and destroying them, together with shreds, nails, or whatever else may have been made use of in training the plants. Mr. Hayward recommends in addition that peach-trees, which are very liable to mildew, should be subsequently washed with a fluid consisting of 4 gallons of rain-water, 2 lbs. of soft soap, 1 lb. of flower of sulphur, 1 lb. roll tobacco, 1 quart of fresh-slaked lime, and 1 pint of spirits of turpentine, the whole boiled together for half an hour.

MILE. This word is derived from *miliare*, the *mille passus*, or thousand paces, of the Romans. Each pace was five feet, and each foot certainly contained between 11·60 and 11·64 modern English inches. [STANDARDS OF LENGTH.] Taking the Roman foot at 11·62 English inches, the original Roman mile was therefore 1614 yards, or nine-tenths and one-sixtieth of an English statute mile, very nearly; while the English mile is a Roman mile and nine hundredths of a Roman mile.

The English statute mile is 8 furlongs, each of 220 yards, or 40 poles of 5½ yards or 16½ feet each. It is also 80 surveying chains of 22 yards each. It is therefore 1760 yards, or 5280 feet. The square mile is 6400 square chains, or 640 acres.

The remains of the Roman mile and the Gallic or Celtic league [LEAGUE] are found in the itinerary measures of most European countries. The following list (taken from Kelly's 'Cambist,' except the statement of the Roman mile) will show the itinerary measures of various countries, as they are usually reputed in English yards and statute miles. We have placed them in order of magnitude. The last column shows in round numbers how many of each make 1000 statute miles:—

Yards.		Stat. miles.	No. in 1000 St miles.
1614	Antient Roman mile	·917	1091
1628	Modern Roman mile	·925	1081
1760	English statute mile	1·000	1000
1808	Tuscan mile	1·027	974
1984	Antient Scottish mile	1·127	887
2240	Irish mile	1·273	786
4263	French posting league	2·422	413
4635	Spanish judicial league	2·634	380
4860	French league of 25 to the degree	2·761	362
6760	Portugal league	3·841	260
6859	German short mile	3·897	257
6864	Flanders league	3·900	256
7416	Spanish common league	4·214	237
8237	Prussian mile	4·680	214
8244	Danish mile	4·684	213
8475	Dantzic mile	4·815	205
9113	Hungarian mile	5·178	193
9153	Swiss mile	5·201	192
10126	German long mile	5·753	174
11559	Hanoverian mile	6·568	152
11700	Swedish mile	6·648	150

The metrical mile of 1000 French metres, or one kilometre, or 1093 English yards, is put down among the measures of France, Italy, and the Netherlands; the geographical mile, or the sixtieth of a degree of latitude, or about 2025 yards, is used in England and Italy; the geographical league of three such miles, or 6075 yards, is used in England and France; the German geographical mile is four English geographical miles, or 8100 yards; the short mile used in Poland (which is also the league of Brabant) is the geographical league (6076 yds.), and the long mile of the same country is the German geographical mile (8101 yds.), which is also the length of the mile in Holland. The Arabian mile is 2148 yards; the Chinese li 632 yards; the Persian parasang 6086 yards; the Russian werst 1167 yards; and the Turkish berri 1826 yards. All the preceding statements relative to modern measures rest on the authority of the work cited.

This diversity of itinerary measures, particularly as observable in countries which were formerly under Roman sway, can only be conjecturally explained; partly by supposing that the mile (Roman) and the league (Celtic) were in process of time confounded with each other (as Ingulphus asserts to have been the case in England), partly by recurring to the well-known tendency to give the same name to measures which were multiples one of the other. [LEAGUE.] It would be much beyond us to attempt any derivation of the preceding anomalous measures, either from the mile or the league, and we shall in the present article confine ourselves to the history of the English mile.

It will be necessary to treat this subject at some length, on account of the manner in which our metrologists and antiquaries have passed it over. The legal history is simply this; that previously to the reign of Elizabeth the statutes on weights and measures confined themselves entirely to the regulation of the smaller standards; while in the 35th year of that queen an act was passed which (perhaps undesignedly on the part of its framers) has fixed the mile at its present length. This statute, though it is always appealed to as if made for the purpose of settling the question, yet in fact does nothing more than incidentally define a mile for a particular purpose. Persons are forbidden to build within three *miles* of London, and the *mile* is to be 8 furlongs of 40 perches of 16½ feet each. But whether this mile had become common, and only wanted the sanction of law, whether it was a new measure intended to be generally enforced, or whether it was meant as the measure for the particular purpose indicated, and for that purpose only, cannot be gathered, at least from the recital in the Statutes at large. It will however subsequently appear that we are not without something like a probable account of the derivation of the measure; and whatever doubt may rest upon the meaning of the statute, it was considered by an authority of the reign of James I. (Cowell) as a general declaration of the length of the mile. Previously however to the act of Elizabeth it may be doubted whether any uniform mile was in existence. Most unquestionably many, perhaps most, writers made use of a mile of 5000 feet, probably not being aware of the English foot having become longer than the Roman, and intending to use the Roman mile. (See the citations in LEAGUE.) Thus Roger Bacon, in his general description of the earth, follows (except as hereinafter mentioned) the Latin writers, and uses their mile as a matter of course, without the least warning of his being aware that he was using a measure different from the popular one of his time. In a writer then on any mathematical or cosmographical topic the mile may be presumed to have 5000 feet. If however the subject had any connection with astronomy, and if Arabian writers were referred to, it was not unusual to use the Arabian mile of 2000 yards (according to Roger Bacon's estimation, Jebb, p. 141).

If, as we believe we shall presently show, a longer mile was in popular use, it may be doubted whether the authors above alluded to were aware of the difference. They certainly did not perpetuate such knowledge; for Dr. Bernard, the most profound of English metrologists, found the mile of 5000 feet sufficiently common in old writings to induce him to give it a name, and call it the English *geometrical* mile, meaning, we suppose, that principally used in mathematical writings; but he does not give the least hint that any other mile, except this geometrical mile and the statute mile, was ever in existence. Nor does his predecessor Greaves, when he remarks that great differences have been observed between measured and statute miles, hint at such discordances being derived from the remains of an old and different measure, or at any acknowledged measure different from the statute mile. This mile of 5000 feet continued in use among seamen, whose measures depend more upon writers on navigation than on acts of parliament, until the earth's dimensions became better known. A very old notion as to the earth's magnitude gave 60, or at most 62½, Roman miles to the degree. The sea mile tallied with that of writers on shore, until the measures of Picard, &c. became well known; but the sixtieth part of a degree of latitude is so convenient a standard measure for the sailor, that under the name of a nautical or geographical mile it

has lengthened with the common estimation of the degree of latitude. Thus in the time of Gunter we find the degree described as 60 miles of 5000 feet each; though he certainly says (*On the Cross-Staffe*, b. xi., cap. 6), that by comparison of observations,* he thinks 352,000 feet nearer the truth. Even almost as late as the Revolution common works written for landsmen describe the sea league as three Italian miles, which answers nearly to 15,000 feet. By the time of Dr. Bernard however we find the sea mile described as coinciding with the statute mile (*De Mens. et Pond.*, p. 202); but this is in a work of science and authority: and Oughtred (before the date of Bernard's book) says that it is 'taken' (or rather mistaken) that 60 statute miles make a degree. It is most likely that the sea league would in the first instance be taken from the common league; and certainly 15,000 feet, or 2·84 statute miles, is almost the same as the length which different deductions will give for the old land league.

We now proceed to the main question, the length of the old English mile: premising that the utmost we can attempt is a clear proof that the old popular mile differed considerably from the modern mile. The gradual changes of this old mile (which the general history of itinerary measures may lead us to suspect) must be traced out by closer investigation of antiquarian authorities than mathematicians have been wont to make, and better estimation of their relative values in a mathematical point of view than antiquaries have hitherto been capable of making.

There is a *tradition* among antiquaries (Sir H. Ellis, *Preface to Domesday*) that this old mile was somewhere about a statute mile and a half. This tradition is not to be relied on; for though in all probability it agrees with the truth, yet it may have arisen from another circumstance. We have more than once heard it proved by the assertion that, even within the memory of man, distances were measured in the remote parts of the country by a longer than the statute mile; for instance, that York was said to be 150 miles from London, while it is really more than 199 statute miles. This is perfectly true; but the reason is perhaps different from that given, as the following account will show:—

The first actual measurement of the roads in England, in statute miles, was made by John Ogilby, cosmographer to Charles II., and was published by him in 1675, under the title of 'Britannia,' with copious descriptions, and 100 copper-plates of the roads, in a large folio volume: the instrument used was called by him a *wheel-dimensurator*, and answers entirely to the perambulator now in use. Various editions of this work were published, of which we have seen three, and D'Anville mentions a fourth. It is worth noting that this measurement, as compared with older ones, soon came into general use: thus in a little work for men of business, called 'The Complete Tradesman, or Exact Dealer's Daily Companion,' London, 1684, we find a list of Ogilby's distances from town to town, compared with those formerly adopted. The latter were called by Ogilby *computed* miles, and the meaning of this word might be doubted, but it is proved to mean miles in common use by previous publications. Thus in Samuel Morland's 'Description and Use of Two Arithmetic Instruments,' &c., 1673 (or two years before Ogilby's publication), we find the distances called 'computed' by Ogilby set down as the (supposed) real distances. D'Anville appears to have seen an edition of Ogilby (of which there is one at least) in which the word *computed* is always contracted into *com.* This he supposed to mean *common*, and the whole of his chapter on English itinerary measures (*Mésures Itinéraires*, cap. x.) must in consequence be read cautiously, as he assumes it to be indisputable that there was a common mile in use at the Revolution, which was about a quarter longer than the statute mile. But on the authority of the silence of Bernard and Greaves, above referred to, we must remain of a different opinion, and must suppose that the computed miles preserved by Ogilby had been intended to represent the number of statute miles, but erroneously given.

What then may these computed miles mean, which had served the common purpose in the estimation of distances? The word computed never meant reputed, but was always applied to a result of reckoning of some kind or other. Ogilby says, 'Whence these computations arose is altogether uncertain; the nearest conjecture is, that they seem to include the whole length of the towns, and to be the distance from the end of one town to the beginning of the next, not regarding the fractional parts of a mile, but taking the lesser integer.' The computed miles always give a smaller figure than the measured ones, or the same, never a greater; and a little examination will render it difficult to suppose that the preceding explanation can be the true one. For independently of its having been the known practice to measure the roads from a conspicuous part of every town, the preceding will not explain differences of four, five, and even seven miles in a stage of less than thirty; neither will it explain long stages being often of the same number of computed as of measured miles. Our own conviction is that the computed miles are nothing more than distances measured on a map in a straight line from town to town, which differ from those measured on the roads more or less, according to the deviations and curvatures of the roads. Should this opinion be correct, we might expect beforehand, first, that the roads in the neighbourhood of the metropolis would appear more direct than the general average; secondly, that the principal roads would show indications of being more straight than the average deduced from all classes, and from cross as well as direct roads. Both these things appear in the general results, and we can clear ourselves of the suspicion of bias in our selection of instances by throwing that task on others. In the first place the roads near London agree so much better in the computation, so called, and the measurement, that both Ogilby and D'Anville notice the circumstance, and conclude that a shorter mile was in use in the neighbourhood of the great city. We find on examination that such is the case with most of the twenty-mile distances about London, which yield about 120 measured miles for 100 computed miles; and this happens particularly with those routes which come earliest in Ogilby's work; but 120 would have been increased almost up to the general average by taking twenty miles on every road out of London.

Secondly, in the 'Exact Dealer's Daily Companion,' already quoted, there is a selection of the roads to which most importance was attached, upon the whole of which 3953 computed miles answer to 5020 measured miles, or 100 computed miles give 127 measured miles. According to D'Anville, Ogilby's whole work gives 7679½ measured miles of road, and 5765 computed, so that 100 computed miles make 133 measured miles. Hence the remaining 2659 measured miles give 1812 computed miles; or, off the principal roads, 100 computed miles give 147 measured miles. These results place, in such large numbers of miles, insuperable difficulties in the way of any explanation which should equally apply to the greater and lesser roads; and it seems to us that there remains only the hypothesis that the computed miles were map-measured* distances, and that the larger and more important roads were straighter than the rest.

It is believed that, since the time of Ogilby, the roads have been much shortened by the various acts of parliament. *Have the milestones been altered accordingly?* or has the increased speed of stage-coaches been in part the result of calling a shorter line of road by the same number of miles? To try this question, we shall compare a few distances from place to place, as given in Ogilby's 'Britannia,' with those in Mogg's edition of Paterson's 'Roads' (1821), altered so as to start from the same point, namely, the old standard in Cornhill:—

	Ogilby.	Mogg.
London to Worcester	112	114
,, Berwick	339	337
,, Bristol	115	117
,, Bridgnorth	142	142

The measures in Ogilby may of course be erroneous; but as they were certainly made with a sufficient instrument, and exhibit every appearance of care, and as in our country it is nobody's business to see that all succeeding milestones are altered when a mile of road is saved in the middle of a line, we suspect strongly that a remeasurement would show our present distances to be too long.

The credit of the antiquaries' tradition, which would otherwise be considerable, is destroyed by its probable origin, as above stated. We now come to another species

* This of course refers to the measure of Snell, which gave 352,285 feet (A.D. 1616).

* If our hypothesis be correct, these computed miles should represent distances on an incorrect map, which in fact they do. We found them agree somewhat better with the county maps in old editions of Camden's 'Britannia' than with our modern maps.

of evidence, the testimony of foreign writers. The new measures of any country found their way abroad but slowly at the beginning of the seventeenth century, and we shall not therefore be surprised to find foreign writers of the middle and end of that century varying from then existing measures in their statements. We shall first take the geography of Varenius, first published in 1650, and edited in 1672 by no less a person than Newton, then Lucasian professor. The following sentence was allowed by the editor to pass without comment:—'Triplicia habent Angli milliaria: majora, quorum 27½ æquant gradum sive 19 Hollandica; mediocria quorum 50; minima quorum 60 vel 55.' Now the mile of Varenius is described by himself as containing 18,000 Rhineland feet, each of which, according to Dr. Bernard, is 1·033 English feet. Whence it may be deduced that the three miles described as English by Varenius severally contain 2·43, 1·33, and 1·11 statute miles (taking '60 vel 55' to be 60). We have no doubt that Varenius has here got hold of the leuca, the old mile or half the leuca, and the modern statute mile, which, being not sixty years old when he wrote, was not, though the contemporary legal measure, more accurately known than the others. Again, Ozanam, in his 'Mathematical Dictionary,' A.D. 1691, makes the English mile a quarter longer than the Italian mile, that is, considerably above the statute mile; but his accounts of itinerary measures are so evidently theorised into round hundreds and thousands of geometrical paces, that no dependence can be placed on any specific results drawn from them. If his geometrical pace be five French feet (Paucton, p. 179), this English mile (which he states at 1250 paces) is 6250 French feet, or 2219 English yards, that is, 1·26 statute miles. But this is hardly worth notice, for no value of the geometrical pace can be taken which will make Ozanam's account of measures consistent with itself. We shall take one more conjectural determination of the mile, derived from the sea league of the seventeenth century. Gunter states this at three miles of 5000 feet in a mile, the league being the twentieth of a reputed degree. The author of the 'Exact Dealer's Daily Companion,' above cited, calls it three Italian miles, or 4904 yards. Now if the original league were the land measure, then the mile (or half of the leuca) would have been 2452 yards, or 1·4 statute mile.

D'Anville endeavours to make the old mile the same thing as the original French league, or the Roman mile and a half [LEAGUE], taking the *computed mile*, already discussed, as the old measure. But independently of the mile thus considered not being long enough (and we have no instance of an itinerary measure shortening by time), the distinction between the mile and the league seems to have been one of the most common notoriety from the time of the earliest manuscripts; and previous to this time the confusion which might have made D'Anville's supposition true had already lengthened the league by 500 paces.

The only way of detecting the length of any measure, a copy of which is not absolutely preserved, is by the knowledge of some quantity, which having been handed down in terms of the old measure, and being still in existence, can be re-estimated in terms of the new measures. Unfortunately we have no very exact measurements of well-known lengths; nevertheless by using such as we have, and taking the mean of a considerable number, the odds are much against any very serious error remaining in the result.

About 1478 William Botoner, commonly called William Wircestre, or William of Worcester, made a tour in various parts of England, and wrote, apparently for his own use, a large number of memoranda, which remained in the library of Corpus Christi College, Cambridge, and were published in 1778, by Dr. Nasmyth, with the title,* 'Itinerarium Willelmi de Worcestre.' The date of the writer is well settled, for he asserts that in the year 1473 he presented to the bishop of Winchester his own translation *into English* of Cicero de Senectute. This William of Worcester was given to measurement: he records the dimensions of the churches which he visited, and the number of miles between the several towns. From the latter enumerations we have collected the most definite instances, which we have compared with our latest road books, as follows (W is the number of miles in W. of W.'s account; R in the road-books):—

	W.	R.
From Oxford to Farringdon	12	17½
„ Farringdon to Wooton Basset	15	9
„ Gloucester to Tewkesbury	7	11
„ Shepton Mallet to Glastonbury	5	8¼
„ Glastonbury to Bridgewater	9	14¾
„ Bridgewater to Taunton	7	11½
„ Taunton to Wellington	5	7
„ Wellington to Collumpton	10	12¼
„ Collumpton to Exeter	10	11½
„ Ottery St. Mary to Exeter	10	13
„ Plymouth to Saltash	3	4½
Totals	93	131¼

To give the best chance of a correct result which our present means afford, we must increase this 131¼ modern road miles in such proportion as will make them correctly represent the same roads at the time when William of Worcester travelled. This we have no data for doing, and any supposition we may make must rest on its own intrinsic probability. To neglect this correction altogether would make the preceding give 100 old miles equal to 141 statute miles, and this is the lowest conclusion which can be formed. But if five per cent. of deviation has been corrected since the old account, that is, if what is now 100 miles would have been 105, then 100 old miles may be stated at 148 statute miles. This conclusion, and even a stronger one, may be reinforced from a totally distinct quarter. But first let it be observed, that since roads have no tendency to lengthen, but the contrary, it may be inferred that such of the preceding instances as make the old mile least are most probably those in which the distances have been shortened; and instead of being the cases of most weight, are precisely the reverse.

Though the preceding instances are quite sufficient, yet it may be satisfactory to name one or two short distances in which a very large mistake is impossible. The following, were they the only ones, would lead us to suspect that the old mile was even longer than a mile and a half statute. William of Worcester says that Wokey Hole is about half a mile from Wells, whereas, by the Ordnance Map, it is a mile and six-tenths in a straight line from the centre of the town. Again, Merkysberry (now Masberry) Castle is placed by him at two miles from Wells on the opposite side: it is now three miles and three-quarters in a straight line from the centre of the town. Lastly, Fenny Castle is said to be a mile and a half westward towards the marsh, whereas what is now called Castle Hill is two miles and three-quarters westward. These instances are more convincing than the preceding as to the mere use of a longer mile, though not so well adapted for its determination.

We must now remove the question to Palestine. In the description of the earth given by Roger Bacon (Jebb, pp. 180-236) he generally follows Pliny, and gives distances in Roman miles, except only when treating of those parts which the Crusaders visited, and other Eastern countries. In this part of his account Bacon relies much on the conversation and writings of a certain Willielmus, who went on a mission from the king of France to the Tartars in 1253, and on the oral accounts of other travellers. But the country on the distances of whose towns he is most precise in his information is Palestine itself. By taking fifteen well defined instances, and measuring the corresponding distances on Major Rennell's map in parts of inches, we have the following, the first column being the number of leucæ in Bacon, the second the number of inches in Rennell. (We omit sea-distances, as likely to err considerably.)

	B.	R.
From Gaza to Ascalon	9	·65
„ Ascalon to Joppa	12	1·12
„ Joppa to Aco	24	2·48
„ Aco to Cæsarea	12	1·10
„ Aco to Tyre	9	1·18
„ Tyre to Sarepta	4½	·49
„ Sarepta to Sidon	3½	·34
„ Sidon to Baruth	8½	1·10
„ Baruth to Gibeleth	9	·87
„ Gibeleth to Tripolis	9	1·21
„ Jerusalem to Joppa	12	1·50
„ Jerusalem to Jericho	9	·67
„ Samaria to Jerusalem	12	1·57
„ Samaria to Cæsarea	12	1·03
„ Aco to Nazareth	7	·72
Totals	152½	16·03

* With it was published the 'Itinerary of the Holy Land,' by Simon Simeon, and whoever would consult the book at the Museum must look under the latter name in the Catalogue. With it was also published the tract on Leonine Verses referred to in the article on that subject.

The scale of Rennell's map is three inches to a degree of latitude; and the only remaining question is, how much must this 16·03 inches, which is a total of distances measured in the shortest lines from place to place, be increased to allow for the deviations of the roads? If we assume that the deviation was equal to that in England at the Revolution, we must* increase 16·03 in the proportion of 100 to 127, which gives 20·3581. It must be remembered that the more allowance is made for deviation, the longer is the leuca; and we think it is the least supposition which can be made, to suppose the deviation on routes in Palestine no greater than in England. Dr. Bernard states that it was the practice of the Oriental geographer Abu Rihan (Al Biruni or Birunius) to deduct one-fifth from distances measured on the roads, to obtain the true distances in a straight line. This amounts to increasing the number of miles measured on the map in the proportion of 100 to 125, and is practically accordant with the preceding rule in a question of which the data are as rough as in the present one. The testimony is valuable as referring to roads in the East, and at the period to which Bacon's account refers. The leuca is then, on these suppositions, ·1335 of an inch on Rennell's map, or ·0445 of a degree. The length of the degree in these latitudes being assumed at 363,500 feet, we deduce 3·064 statute miles as the length of a leuca, or 1·532 statute miles as the length of the old mile. If we were to reject the correction for deviation, the result would be 1·206 statute miles, which is unquestionably too small.

In 1422 Sir Gilbert de Lannoy was sent by Henry V. of England on a tour of military observation in Egypt and Syria. His account is published (from a manuscript in the Bodleian) in the 21st volume of the 'Archæologia.' He never mentions the league more than once or twice, and gives all his distances in miles. From his account of Egypt we soon found that no hypothesis would make his distances agree with modern travellers. He places the city of Cairo, for instance, three miles from its port Boolak, which distance is now called only *one* mile. [KAHIRA.] But on examining his distances in Palestine there appears almost a certainty that he used a smaller mile, of which two and a half (and not two) make the league of Roger Bacon. The following are all the comparisons which his work affords us the means of making:—

	Bacon. Leagues.	Lannoy. Miles.	League in Miles.
From Joppa to Aco	24	60	2·5
„ Aco to Tyre	9	25	2·78
„ Tyre to Sidon	8	20	2·5
„ Sidon to Baruth	8½	25	2·94
„ Jerusalem to Joppa	12	30	2·5

But even Lannoy's mile must be longer than our statute mile; and it is difficult to explain the difference. One thing is certain, that Lannoy's mile in 1422 cannot be the same thing with that of William of Worcester in 1473, or that of Bacon in 1250, being shorter than either.

So far our conclusions proceed upon assumptions of the highest probability; and the result is, that from the English measurements we may infer that 100 antient miles certainly exceed 141 statute miles, while from those in Palestine they are most likely not much less than 153 such miles. It is highly probable that the result is nearer to 153 than to 141. If we were to take a mean of both results, giving them equal weights, the mile thus obtained would be probably too small, and this result is 1·47; so that (as mentioned in LEAGUE) the ratio of 145 to 100 (misprinted 45 to 100) is the very least which is admissible, and perhaps too small even for a minimum. It seems to us that a more probable result would be obtained by taking 153 as a result of the measure in Palestine (for it is hard to believe that the correction for deviation could have been too much), and giving this number twice as much weight as 141 in forming a mean of the two. This gives 149 in place of 147; or, roughly speaking, we think it by no means improbable that 100 antient miles are as much as 150 statute miles, and tolerably certain that they exceeded 145 such miles. At the same time there is evidence enough that very different miles were in use among writers, and also that the most ignorant confusion between antient and modern measures frequently existed. Sir John Maundevile, for instance, says, 'Aftre the auctoures of astronomye, 700 furlonges of erthe answeren to a degree of the firmament: and tho ben 87 miles and 4 furlonges. Now be that here multiplyed by 360 sithes; and than thei ben 31,500 myles, every of 8 furlonges, aftre myles of oure contree.' The old astronomical authors use the stadium, which is here made to be the English furlong, a measure with which it had no connection.

* We take this from some rough trials, out of Ogilby's book, but we rely more on the eastern geographer presently mentioned.

There is certainly this difficulty in the way, that [LEAGUE] the antient minimum distance between two market-towns must have been 19 modern statute miles, which seems a great distance. But it must be remembered that this appearance is a consequence of the notions derived from the modern interpretations of the courts, which make the leuca to be a statute mile; so that seven miles has long been the legal distance. This interpretation is so preposterous that it must be thrown aside; for even if the mile of Bracton and Fleta were the mile of the *books*, and not the mile of the *people*, the leuca would be 10,000 feet, or two statute miles all but the tenth of a mile. And the reason given by Bracton certainly requires some greater distance than seven miles. For he implies [LEAGUE, vol. xiii., p. 376] that the third of a day's work should be half the distance of two markets; and gives a time for buying and selling not longer in duration than that allowed for going to the market. Reading this paragraph by the modern interpretation of the courts, the time of business would be that in which a laden horse or market-cart would go three miles and a half: and if, taking into account the badness of roads in the fifteenth century, we allow even as much as two hours for this, then the day's work would be only six hours. According to our reading the time of going nine miles and a half would be the time of business; or allowing three miles an hour, the day's work would be something more than nine hours. It may however be possible, and not improbable, that the mile of 5000 feet, or that of the books, was that of the courts of judicature, which would give about 12½ statute miles as the distance in question.

We conjecture that the length of the antient mile arose from that confusion between the mile and the leuca which is referred to by Ingulphus. [LEAGUE.] The leuca of fifteen hundred paces would, when the foot attained its permanent length, be 1·42 modern statute miles, to which the term mile being applied, we have the probable beginning of the old mile, that is, we adopt D'Anville's conclusion on different grounds. If in the meanwhile the leuca of 2000 paces came into use (as, according to Ingulphus, it did), which would be called in the books two miles (as in fact it was two miles of the *writers*), it is by no means surprising that a new leuca of two long miles should be formed from the mile of the people. This would be but a poor conjecture for the establishment of a measure; but it has great force in reference to a mile, the existence of which is separately proved. And though Ingulphus states that the word leuca was introduced as meaning a mile, yet it is more likely that the new measure should have been introduced under the old name, than the new name for the old measure: it is moreover tolerably certain that the conquerors would attempt to introduce both their measure and its name, while the people would be able to resist the latter, but not the former.

The origin of the statute mile may perhaps be explained as follows:—The furlong, or quarantena, was not a part of the Roman itinerary system of measures. It grew out of the perch, or perticata, a measure originally of small lengths, as in buying or selling of land, 40 of which were made into one by the simple name of forty-long, or furlong. The great variations of the perch, in different parts of the country, induced the legislature, at a very early period, to fix it at five yards and a half. It did not harmonise with the book-system of measures, and we see [LEAGUE] that when it was introduced there, the mile was awkwardly described as seven furlongs and a half, three perches, and two palms. The legislators of Elizabeth, who were well acquainted with the stadium, seeing the mile of the books (and perhaps of the courts) making upwards of seven furlongs and a half, might very naturally restore the nominal accordance of the old and modern systems, and at the same time avoid fractional quantities, by lengthening the mile into eight furlongs.

MILFORD HAVEN. [PEMBROKESHIRE.]

MILHAU, a town in France, in the department of Aveyron; in 44° 5′ N. lat. and 3° 5′ E. long.; on the road from Paris to Narbonne, through Moulins, Clermont, and St. Flour: the distance is not given in the road-books.

Milhau is said to have been known to the Romans by the

name of Æmilianum, a name which indicates a Roman origin. It is not however noticed by D'Anville. In the religious wars of the sixteenth and seventeenth centuries, it was one of the strongholds of the Calvinists. Louis XIII. possessed himself of it in A.D. 1629, and ordered the fortifications to be destroyed. The town is situated on the right bank of the Tarn, in a pleasant valley surrounded by hills covered with peach and almond trees. It is well laid out, but the streets are narrow. Many of the houses and the public fountains are handsome: there is a good 'place' or square and some agreeable promenades. There is a bridge over the Tarn, supposed to be of Roman erection.

The population, in 1831, was 8847 for the town, or 9806 for the whole commune; in 1836 it was 10,450 for the commune. The inhabitants manufacture a considerable quantity of woollen cloth, serge, chamois and other leather, and gloves. Cheese, which resembles the 'Roquefort cheese,' and is sold under that name, is made in the neighbourhood in cellars hollowed out of the rock. Considerable trade in raw and spun wool, leather, timber for various uses, wine, and sweet and bitter almonds, is carried on. There are a subordinate court of justice, a commercial court, a board of trade, and some fiscal government offices; an agricultural society, a high school, a drawing-school, and an hospital. There is a Protestant church, under the direction of the consistory of St. Afrique.

The arrondissement of Milhau has an area of 772 square miles, and comprehends 39 communes: it is divided into 9 cantons or districts, each under a justice of the peace. The population, in 1831, was 63,603; in 1836, it was 65,800.

MI'LIOLA, a family of FORAMINIFERA, vol. x., p. 348.

MILITARY FRONTIER (Hungary). This is the name given to a tract of country which extends from the Adriatic Sea to the Bukowina, between the frontiers of Illyria, Croatia, Slavonia, Hungary, Transylvania, and those of Turkey. Its length is about 1000 miles, from Povile, on the Adriatic, in 16° 48′ E. long., to the defile of Ostocz, in 26° 25′ E. long., and it lies between 44° 7′ and 47° 36′ N. lat.; its breadth varies in different parts: the area is about 18,000 square miles. The whole of this tract is divided into—1, the Western or *Croatian* Military Frontier; 2, the *Slavonian* Military Frontier; 3, the *Hungarian* or *Banat* Military Frontier; 4, the *Transylvanian* Military Frontier.

This tract is distinguished from the rest of the Austrian monarchy by having its own purely military government. All the peasants are soldiers, of whom, in time of peace, 45,000 men are always under arms; but in 1815, before the peace, there were 62,000. This force was originally intended as a barrier against the inroads of the Turks. By this tenure the peasants hold from the state the hereditary usufruct of their lands. This singular institution secures to the state the services of a great military force (there being above 100,000 men capable of bearing arms), which in time of peace costs the state nothing. These well-trained and disciplined soldiers defend their own frontier both against hostile attacks and the plague without pay, and in time of war serve the state in the same manner as the rest of the army, and receive the usual pay. They are divided into seventeen regiments of infantry, one of hussars, and one battalion of sailors. Each regiment consists (in time of peace) of two battalions, or twelve companies, which serve in turn, has its own staff, and is commanded by a colonel, who exercises both the civil and military authority. Two regiments make a brigade. The military authority is divided among what are called four general commands, the seats of which are, at Agram for the Croatian frontier; at Peterwardein for the Slavonian; at Temesvar for the Hungarian; and at Hermann for the Transylvanian: the whole is under the supreme direction of the Aulic Council of War at Vienna. According to the military constitution, the generals superintend the civil affairs and the administration of justice. Under the general are the regimental commanders, who are in the place of district authorities; in short, all civil officers hold military rank.

Face of the Country; Soil; and Climate.—A great part of the country is mountainous, the western part being traversed by the Julian Alps, and the eastern by branches of the Carpathians. Many fine valleys, some of them rich in picturesque beauty, lie between the branches of the mountains: the remainder of the country is pretty flat. The western part of the Banat is a sandy plain covered with sandhills from 60 to 180 feet high. On the banks of the Danube, the Theiss, and the Temes, there are extensive marshes. In the mountainous parts the temperature is that of more northern countries; whereas the lower central parts enjoy a climate resembling that of Italy. The soil is on the whole very fruitful, especially in the plains, and in several valleys of the Banat. For the natural productions, see HUNGARY.

Manufactures.—There are no manufactures of any importance. The women, as well as the men, show great skill and ingenuity in manufacturing almost every article for their own consumption. There is a very great export trade in the productions of the country. The extensive forests supply great quantities of excellent timber. That of Jablanacz is much esteemed in England for ship-building.

Variety of Nations; Languages; Religion; and Education.—The population is at present (1839) at least 1,200,000, and is of many different races, two-thirds however being of Slavonian origin, namely, Croatians, in the Croatian Military Frontier, and the Slavonians and Servians (Illyrians or Russians), in Slavonia and the Banat. The three other principal nations are less numerous, namely, the Wallachians (perhaps above 150,000), in the Transylvanian and Banat Military Frontier, and the Hungarians and Szekler in Transylvania. Besides these there are Magyars, Germans, Greeks, Jews, and Gipsies. The Clementines are of Albanian origin, so called from their leader Clement. They are not above 2000; they inhabit two villages in the district of Peterwardein, and have retained their manners and language. The majority of the inhabitants are of the Greek not-united Church, in 450 parishes; next in number are the Roman Catholics, in 330 parishes. The united Greeks have 150 parishes; the Protestants (about 50,000 in all) are Calvinists, having 85 parishes, Unitarians 10, and Lutherans 4 parishes. 'All the inhabitants of the Military Frontier,' says Hassel, 'are endowed with admirable natural faculties, and, whether in the rude climate of the Carpathians, or the milder temperature of the plains, are distinguished for talent. But all these excellent gifts of nature are still buried, generally speaking, in profound slumber; and it is but lately that some efforts are perceived to call them into action. The government has done much to promote public instruction; but the number of schools is far too small, especially amongst the followers of the Greek Church; so that frequently there is not a single school in a tract of many leagues in extent.' This, it is true, was written twenty years ago; but it would seem that little progress has been made since that time, for the number of schools stated to exist in 1820 is quoted without alteration in the Austrian 'Encyclopædia' in 1838. The great variety of costume appears surprising to a stranger; for while persons in office and the ladies in the towns adopt the fashions of Vienna, each nation and tribe has its own costume, which in Croatia and some other parts has a striking resemblance to that of some countries of the East. Various and often unjust judgments have been passed on the character of these people: with some exceptions, of course, they may be described, according to Hassel, Blumenbach, and other writers, as a people of great natural talents, acute, docile, very patriotic, devotedly attached to the Imperial house, brave, frank, hospitable, fond of music and poetry, and possessing a great degree of national pride. Their domestic arrangements are founded on the patriarchal way of life, derived from remote ages, which the government has carefully maintained. All the branches of a family (called a house communion) live together, and several generations are found at the same time in one house. The head of the family, called the Goszpodar, exercises a kind of patriarchal authority, which all the members are bound to respect and obey. The males who are of age have however a vote in the discussion of all important family concerns. The mother, who is called Goszpodaricza, presides over the internal affairs, and superintends the female members of the family. The property of the family is in common, and no one is exempt from the duty of working. Each person who works has an equal share in the produce, but the Goszpodar and his wife have each a double portion. No member is allowed to have land or cattle of his own; but he may possess money and furniture. He who leaves the house without the consent of the elders and the regiment is reputed a deserter. Daughters who marry into another house have a smaller portion. Such a family often consists of 30, 40, and even 80 members. [PETERWARDEIN; SEMLIN.] (Von Hietzinger, *Statistik der Militärgrenze*, 1822; *Oesterreichische National Encyclopedie*, 1838; Hassel, vol. ii.; also Stein, Horschelmann, and other writers.)

MILITARY POSITIONS are the sites occupied by

armies either for the purpose of covering and defending certain tracts of country or preparatory to the commencement of offensive operations against an enemy.

A position is considered as advantageously chosen when it is on elevated ground; when it is not commanded by eminences within the range of artillery; and when, from the existence of natural obstacles, as rivers or marshes, on the wings, it is incapable of being turned, that is, the enemy cannot without making an extensive movement get to the rear of the army by which the position is occupied. In the event of such points of support being wanting, the position, whether it be a plain or an eminence, should have its flanks protected by villages, or by redoubts raised for the purpose; for the flanks being the weakest points of the line, since the troops there are only defended by their own fire, they particularly require to be strengthened by the impediments of the ground or by fortifications, in order that the enemy, in any attempt to turn the position, may be retarded till reinforcements can be brought up to oppose him.

The advantages possessed by an army on commanding ground consist in the troops being able to see the manœuvres of the enemy while their own are concealed; the fire also, being directed downwards, is more effective than that of the enemy, which is made upwards from a lower level. The existence of woods or hollow ways in front of a position is considered as an unfavourable circumstance, since an enemy might there place divisions or parties for the purpose of attacking the line by surprise; but, on the other hand, a wood in the rear, if it should not be such as to create an impediment to the passage of the troops through it, might become advantageous in the event of a retreat, as it would afford a temporary cover for the retiring columns. A village or even a single building on the ground occupied by the army may become the key of the position; and as, frequently, on the preservation of this point depends the possession of the field of battle, such point should be well supported by troops and artillery. At the battle of Coruña, in 1809, the village of Elvina was twice contested by the opposing armies; and on the field of Waterloo, the Château de Goumont was the object about which the action raged with the greatest violence. The highest point of ground, particularly if near the lines of operation (the roads leading to the magazines), may also constitute the key, and it is usually strengthened by one or more redoubts. It would evidently be advantageous if such key were near the centre of the line, because, on any change in the disposition of the latter, the key might still be retained, and if the wings are separated from each other, it might prevent either of them from being cut off by the enemy; whereas if situated at one extremity, it might, on a wheel of the army taking place, become so remote as to be incapable of being supported.

The elevated ground which constitutes the position should be able to contain all the troops who are to occupy it, but it should not much exceed the extent necessary for this purpose, lest, not being able to defend the whole, the army should be deprived of the advantages arising from a superiority of command, in consequence of the enemy gaining some part of the height.

However favourable a position may be with respect to the elevation of the ground, that circumstance will be of small value if the troops and artillery cannot be conveniently placed on it. It is indispensable that the ground afford ample room for the manœuvres of that species of troops in which the strength of the army chiefly lies; and at the same time it may be observed that, in making choice of a position, the ground in front should be as much as possible disadvantageous in that respect for the enemy. The Spanish General Cuesta is blamed for having, previously to the battle of Rio Seco in 1808, placed his army in such a situation that the ground before it was in the highest degree favourable for the action of the French cavalry, which was particularly numerous. Artillery should always be placed where it can act with most effect; and when the ground occupied by an army presents alternately salient and retired points along the front of the line, the batteries should be placed at all such points. At the former, in order that the lines of fire may effectually command the approaches by which the enemy's columns may advance; and at the latter, that they may defend the descending ground immediately in front of the others. Infantry may occupy any kind of ground, but should, if possible, always form a close line: it is usually placed between the batteries; and, if exposed to a distant cannonade, the troops may be drawn up in a trench, the earth from which will serve to cover them without preventing them from marching out in line to meet the enemy. Cavalry must be posted on a level plain, over which it may advance with regularity when a charge is to be made; if compelled to act on broken ground, it is formed in small detachments behind the infantry, through whose intervals it may pass at proper opportunities. It may be observed that every disposition of an army for defence should correspond to that of the works which constitute a fortified place. The batteries at the advanced points of the line serve a purpose similar to that of the guns in the flanks of bastions; and the intermediate line of troops forms a sort of curtain.

In the choice of positions for offensive operations, such should be taken as have no rivers or broken ground in front; since these would impede the contemplated movements towards the enemy: small inequalities, behind which infantry or cavalry may be concealed, are however advantageous, as they afford the means of occasionally making attacks by surprise. On the other hand, when an army is on the defensive, the front as well as the wings should be protected by every obstacle to the progress of the enemy which nature may present or art can devise: among those afforded by the latter may be mentioned the blocking up of roads by abatis or traverses; preparing countermines, by which, on the enemy's advance, the roads may be destroyed; rendering fords impassable and even forming inundations by constructing dams across the streams. It should be observed however that when a defensive position is covered by a river, the line of troops should be at 800 or 1000 yards in rear of the latter, in order that sufficient space may be afforded for the troops to act against the enemy in the event of his forcing a passage across; and, in all cases, every obstacle in the way of a free communication within the position ought to be removed, that the troops may easily succour each other when attacked. Whatever be the nature of the obstacles opposed to the enemy, they should be within the range of the artillery of the line; and then the position may be considered as impregnable, since an enemy would find it scarcely possible either to form or deploy his columns of attack on broken ground and under a destructive cannonade. Good roads, on the other hand, should exist, or should be formed, in the rear, both to facilitate the arrival of supplies from the magazines or depôts, and to favour a retreat, should the latter step become necessary. An army always retires in disorder under the fire of the enemy, and its danger is greatly increased when the retrograde movement is embarrassed by walls, ravines, streams, or other impediments; the divisions then become separated from each other, and some of them are generally cut off by the enemy before they can be supported. It would be advantageous that the ground in rear should command that of the position itself; for then the army, in retreating, would obtain a superiority of elevation over the pursuing enemy; and it might even have an opportunity of renewing the action with a prospect of success.

A knowledge of the art of choosing military positions is an important qualification in the staff-officers of an army: and these officers should continually exercise themselves in forming correct judgments concerning the fitness of ground for such positions. They should be able to ascertain at once, by the eye, its extent and the stations it may afford for troops of the different arms, so that those of all kinds may act with the greatest effect and duly support each other; and, consequently, they should be able to determine the order of battle which is the most advantageous for the ground to be occupied. They are also to judge of the facilities which the roads may present for an advance or a retreat, or for the conveyance of supplies from the magazines; and, finally, of the obstacles which the ground in front may oppose to the movements of the enemy. The power of readily appreciating the character of ground in all these repects is what is called, by foreign writers, the military coup-d'œil; and this can only be acquired by a profound knowledge of the tactics of war joined to much experience in the practice of executing military surveys, and of contemplating the appearance of ground from all possible points of view. These points being the supposed stations of the enemy, the staff-officer should accustom himself to observe from thence how the latter might make his attack; for then only can he judge in what manner an attack ought to be opposed; that is, what disposition of troops and artil-

lery would be the most favourable for resisting it when made. Continual meditation, from his youth, on the subjects above mentioned is stated by Livy to have distinguished the Achæan general Philopœmen, who was thus always prepared to avail himself of the advantages of ground in the disposition of troops for action.

MILITIA. The body of soldiers raised for the defence of a nation may be called the militia of that nation; but in Great Britain and Ireland the term is applied particularly to those men who are chosen by ballot to serve for a certain number of years within the limits of these realms. The regulations of the militia service differ widely from those of the conscription on the Continent; since under the latter the troops become members of the regular army, and may be marched beyond the frontiers of the state; whereas the militia is enrolled only for home service, and may be said to constitute a domestic guard. Nothing corresponding to a modern militia can be said to have existed among the antients. In the Grecian states every citizen was a soldier; and every person, between certain ages, in the city and in the provinces, was obliged to serve in the Roman armies wherever they might be employed.

The military force of this country in the time of the Saxons was formed by a species of militia, and every five hydes of land were charged with the equipment of a man for the service. The ceorles, or peasants, were enrolled in bodies and placed under the command of the Ealdermen or chiefs, who were elected by the people in the folkmotes. After the Norman conquest of the country the proprietors of land were compelled, by providing men and arms in proportion to their estates, to contribute to the defence of the realm in the event of a threatened invasion. The troops were raised under the authority of *commissions of array*, which were issued by the crown; and the command was sometimes vested in the persons to whom the commissions were granted; though frequently the high constables, or the sheriffs of the counties, commanded in their own districts. This militia seems, at first, to have been liable to be marched to any part of the kingdom at pleasure, but in the reign of Edward III. it was decreed by a statute that no man thus raised should be sent out of his county, except in times of public danger. From the reign of Philip and Mary the lords-lieutenants have had the charge, under the sovereign, of raising the militia in their respective counties.

Charles I. having, by the 'Petition of Right,' been deprived of the power of maintaining a disposable body of troops in the country, found himself, in 1641, unable to suppress the rebellion then raging in Ireland; and was in consequence induced to commit the charge of restoring peace to the care of the parliament. The latter immediately availed itself of the circumstance to get into its own hands all the military force of the nation; and in the following year the two houses passed a bill in which it was decreed that the power over the militia, and also the command of all forts, castles, and garrisons, should be vested in certain commissioners in whom they could confide. The king having refused his assent to the bill, the parliament made a declaration that it was necessary to put the nation in a posture of defence, and immediately issued orders to muster the militia; on the other hand, the king issued commissions of array for a like purpose to some of the nobility, and thus commenced that war which desolated the country for several years.

When Charles II. ascended the throne, the national militia was re-established on its former footing, and the chief command was vested in the king. The lords-lieutenants of counties were immediately subordinate to the sovereign, and granted commissions (subject however to the king's approbation) to the field and regimental officers who commanded under them. New regulations respecting the amount of property which rendered persons liable to the charge of providing men and arms were then established; and at that time no one who had less than 200*l.* yearly income or less than 2400*l.* in goods or money could be compelled to furnish a foot soldier; nor could one who did not possess 500*l.* per annum or an estate worth 6000*l.* be made to provide a man for the cavalry. Persons having less property were required, according to their means, to contribute towards finding a foot or a horse soldier. The militia was then mustered and trained, by regiments, once a year and during four days; but the men were mustered and trained, by companies, four times in the year, and during two days each time. At the periods of mustering, every man was obliged to provide himself with his own ammunition.

These regulations, being found to be expensive, at length ceased to be observed, and the trainings of the militia were discontinued in every part of the realm except the city of London. In 1756, under an apprehension that the country was about to be invaded by a French army, considerable bodies of Hanoverian and Hessian troops were brought over for its defence; the spirit of the nation revolted however at the disgrace of being indebted to foreign mercenaries for protection; and these troops being sent back to the Continent, a national militia was again raised and organised under the sanction of an act of parliament in the 30th year of George II. The measure was generally popular, though it did not meet with universal approbation; and there were many persons who maintained the opinion that, for want of military knowledge and habits, this species of force could not be relied on in the event of its being called into active service. Experience has however shown that such an opinion is quite destitute of foundation; and it was soon afterwards admitted that, when well disciplined, these constitutional battalions rivalled those of the regular troops in the performance of all military evolutions. It may be observed here, that the greater part of the 16,000 British troops who gained the battle of Talavera were men drafted from the militia regiments at home; and so recently had they joined the army in Spain, that in the action many of them bore on their accoutrements the numbers of their former corps. (Napier, vol. ii.)

The militia laws were repealed in the 2nd year of George III., when a new act regulating the service of this force was passed; and in the 26th George III. all the previously existing statutes relating to the force were formed into one law. New regulations however were made by acts passed in the 42nd, 51st, and 52nd years of the same reign. The militia of the kingdom is now embodied under general officers, and is subject to the provisions of the mutiny act, or articles of war. The king is empowered to employ it in any part of the United Kingdom, but not out of it. The militia of Great Britain may serve in Ireland, and that of Ireland in Great Britain: the period of service for each, out of the island to which it belongs, being at most two years. When called into active service the officers rank with those of an equal grade in the regular army, but as the juniors of each grade, and they may receive promotion for meritorious services during a rebellion or an invasion; but no officer of militia can serve on a court-martial at the trial of an officer or soldier of the regular troops.

All persons not labouring under bodily infirmity and not specially excepted, are liable to be chosen for private militia men and to serve either personally or by substitute. The persons excepted are—peers of the realm; commissioned and non-commissioned officers and privates serving in the regular forces; half-pay officers of the navy, army, and marines, and commissioned officers who have served four years in the militia; members of corps of yeomanry and volunteers, and privates serving in the local militia; seamen and persons doing duty in the royal docks, at the gun-wharfs, and powder magazines; also persons employed under the direction of the Board of Ordnance; resident members of the two universities; clergymen of the Established church; also Protestant dissenting preachers, provided they take the oaths of allegiance and supremacy, and exercise no other occupation, or only that of schoolmaster; constables or other peace-officers; articled clerks; apprentices; free watermen on the Thames; poor men having more than three legitimate children, and persons above 45 years of age. To alleviate the distress of a poor man, when drawn for the militia, and who has provided a substitute, the churchwardens of the parish are bound to return to him a sum not exceeding 5*l.*, or half the current price of a substitute. No one having served personally, or by substitute, during three years in the militia, can be obliged to serve again till it comes to his turn by rotation; but if a man has served as a substitute for another, this does not exonerate him from serving again if chosen by the ballot.

The militia is trained and exercised by battalions or regiments twice in a year, and during fourteen days each time, or once in a year for twenty-eight days, at the discretion of the lords-lieutenants or their deputies.

The supplementary militia is an additional body of men which was first raised in 1793, for the defence of the country at that juncture. It is still continued to be raised when

the necessities of the state require it, and it is subject to the same regulations as the ordinary militia. The local militia was a body raised in 1809, for the purpose of replacing, in certain districts, the corps of volunteers. By the 52nd George III., this force may be marched to any part of Great Britain in the event of a rebellion or an invasion, and it may be kept embodied till six months after the former is terminated or the latter repelled. Persons enrolled in the local militia cannot be compelled to serve in the regular militia till one year after their period of service in the former has expired.

The whole amount of the several militia forces in England alone exceeds 200,000 men; and during the late war, when an invasion of the country was apprehended, the force which might have been assembled in arms amounted to more than twice that number of men.

In France a militia was first raised from the provinces during the reign of Louis XIV.; but the several corps were disbanded after the peace of Ryswick. In 1726 was organised a force of the like kind, consisting of men chosen by lot from the towns and villages, and held in readiness to be assembled when required: and in 1778 these provincial troops were formed into 106 battalions. Since the great Revolution, the National Guard may be said to constitute the militia of France.

In the United States of America, by an act passed in 1792, the principal provisions of which are still in force, all able-bodied white male citizens between the ages of eighteen and forty-five, with certain exceptions, are enrolled in the militia; and when drafts are to be made for active service, the individuals are selected by ballot as in this country. The persons excepted are the executive, judicial, and representative officers of the Union, those who are employed in the post-office department, &c.; and, in some of the states, persons are exempted who have scruples of conscience against bearing arms. The president has the power of calling out the militia of the states; and, when on active service, it is subject to the same rules and articles of war as the regular troops, but courts-martial for the trial of military offenders are composed of militia officers only.

A national militia is an institution of the highest utility to a state; the men being engaged in military occupations only so long as may be necessary for becoming qualified to serve as soldiers when called upon to take the field, and being at all other times employed in labours subservient to the practice of the useful arts. They thus possess the united characters of defenders of their country and of contributors to its prosperity, while they remain connected in social union with their fellow-citizens, and are interested, like them, in the support of the laws and in the preservation of good government. It is in some respects otherwise with the soldiers of a regular army, who, devoted exclusively to the profession of arms, and though their services are indispensable in the prosecution of foreign wars, have few feelings in common with the civil portion of the community; and who, except in a nation like Great Britain, where the military power is duly subordinated to the civil magistrate, might, under the influence of an ambitious chief, become dangerous to the liberty of their country.

MILI'ZIA, FRANCESCO. According to the autobiographical sketch which he has left us, Milizia was born at Oria, a small town of the province of Otranto, in the kingdom of Naples, in 1725, and was of a noble and wealthy family. When nine years old, he was placed under the charge of his maternal uncle, who practised medicine at Padua. With him he remained about seven years, when he ran away from him and joined his father, who was then at Rome, and who sent him to Naples, where he studied logic and metaphysics under the celebrated Genovesi, and physics and geometry under the Padre Orlandi. He was more anxious however to study the world, and set out from Naples with the intention of going to France, but his finances would carry him no farther than Leghorn. After this he was obliged to content himself with leading a half studious, half indolent life at Oria. At the age of twenty-five, he married a young lady of family at Gallipoli, and having obtained a handsome allowance from his father, went to Rome, where he ultimately settled with his wife, in 1761. It was here that he began to apply himself diligently to the study of [architecture, and published his Lives of the Architects, or 'Vite degli Architetti piu celebri,' in 1768, which was followed by his treatise 'Del Teatro,' in 1772, a production that excited so much scandal on account of certain observations in it, that it was suppressed by withdrawing all the copies; yet was soon afterwards republished at Venice. His 'Principles of Civil Architecture,' first published in 3 vols. 8vo., in 1781, and considerably improved in the third edition at Bassano, 1785, greatly extended his literary reputation, being, at the time of its appearance, almost the first attempt to base the art on rational principles, and to expose the pedantry with which it had been taught. It is moreover written in an attractive style, and is seasoned with not a little mordacity and causticity in some of the remarks. On this latter account, while it was admired by young students, it was censured by many more advanced professors, who charged the author with speaking too freely of many eminent names, with attacking authorities, and propounding his own views without regard to the example of others. His 'Arte di vedere nelle Belle Arti,' in which he showed himself a strong partisan of Mengs, is another work written with great eloquence, and with equal freedom of opinion, impugning Michael Angelo, among others, with unsparing severity. He also published a work entitled 'Roma delle Belle Arti di Disegno,' and his 'Dizionnario delle Belle Arti,' which latter, first printed at Bassano, in 1797, 2 vols. 8vo., is chiefly a translation from the 'Encyclopédie Méthodique.' After this, disgusted at the attacks levelled against his 'Roma,' he not only desisted from publishing the second and third parts which he had proposed of that work, but abandoned the fine arts, and took up the study of natural history. He died at Rome, in March, 1798.

Milizia had for a short time held the appointment of superintendent of the buildings in the Ecclesiastical States belonging to the king of the Two Sicilies, but he resigned it in 1786, not caring to have any such responsibility or tie upon him. His 'Lettere inedite,' addressed to the Count Sangiovanni, and first published at Paris, in 1827, serve to portray his disposition, and, without the testimony of his other writings, to convince us that he abhorred pedantry and dogmatism, false enthusiasm, and quackery. They abound with very free remarks on persons, and are seasoned with much caustic humour. An English translation of his 'Lives of the Architects' appeared in 2 vols. 8vo. in 1826, but besides being badly executed and full of gross errors of the press, it does not supply those names which Milizia omitted, nor the numerous other names that ought now to find their place in such a work.

MILK is an opaque fluid, secreted by the mammary glands of the females of the animals belonging to the class Mammalia, and adapted to the nourishment of their young offspring. It is of a specific gravity somewhat greater than that of distilled water, and possesses a peculiar odour, which is due to several acids. It consists, in addition to the watery portion, serum, &c., of globular particles, which are not more than half the size of the globules of human blood, having a diameter of about one ten-thousandth of an inch. They are composed of a fatty matter (butter) and a coagulable substance, which in many points resembles albumen, termed *caseum*.

The globules are specifically lighter than the fluid in which they are suspended, and easily ascend to the top when the milk is allowed to stand. This constitutes the cream, and consists of the butter, with some caseum and a portion of serum. By agitation, such as is effected by the various modes of churning, the fatty globules unite into a mass (butter), leaving the buttermilk, which consists of caseum and serum.

Milk from which the supernatant fluid, or cream, has been removed is termed skim-milk, and still retains a considerable quantity of coagulable or caseous matter, which may be separated from the serum, or whey, by means of a rennet or any acid. This coagulated portion constitutes the curd, and is the basis of cheese. If a rennet be used, and all the portion coagulated by its means be separated, the addition of vinegar causes some of what remains to coagulate; and this has been termed *zieger* by Schubler, but it is not certain that it differs from caseum. What remains after both these coagulated principles have been removed is the whey, which contains sugar of milk, some azotized substance (perhaps osmazome), lactic acid, and various salts.

The different constituents of milk, and the differences in the relative proportions of them in some of the common domestic animals, will be best seen in the following tables drawn up by Mr. Pereira:—

- **Milk**
  - **Cream**
    - Butter
      - Fatty Matter, solid at ordinary temperatures . . . *Stearine.*
      - Liquid Fatty Matter
        - By saponification, yielding Butyric, Caproic, Capric, Margaric, and Oleic Acids, and Glycerine . . . *Butyrine.*
        - By saponification, yielding no Butyric, Caproic, nor Capric Acids . . . *Oleine.*
    - Buttermilk
      - Caseum.
      - Serum.
  - **Skim-Milk**
    - Matters which are coagulable
      - by Rennet . . . *Caseum or Curd.*
      - not by Rennet, but by Acetic Acid . . . *Zieger.*
    - Serum or Whey
      - Azotized Matter . . . *Osmasome?*
      - Lactic Acid.
      - Salts
        - Soluble in Alcohol
          - Lactates of Potash, Soda, Ammonia, Lime, and Magnesia.
          - Chlorides of Potassium and Sodium.
        - Soluble in Water, not in Alcohol
          - Sulphate of Potash.
          - Phosphate of Potash and Soda.
        - Insoluble in Water
          - Phosphates of Lime, Magnesia, and Iron.

100 Parts of the Milk of the	Cream.	Butter or Fatty Matter.	Caseum.	Sugar of Milk.	Total Butter, Caseum, and Sugar of Milk.
Ewe (Stiprian Luiscius, and Bondt)	11·5	5·8	15·3	4·2	25·3
Goat (ditto)	7·5	4·56	9·12	4·38	18·06
Goat (Payen)	not stated	4·08	4·52 including insoluble salts.	5·86 including insoluble salts.	14·46
Cow (Stiprian Luiscius, and Bondt)	4·6	2·68	8·95	3·60	15·23
Cow (Berzelius)	not stated	4·5	6·10	3·5	14·10
Woman (Payen) 1st case	not stated	5·16	0·180	7·62	12·96
Woman (Payen) 2nd case	not stated	5·2	0·250	7·930	13·38
Woman (Payen) 3rd case	not stated	5·18	0·240	7·86	13·28
Ass (Stiprian Luiscius, and Bondt)	2·9	..	2·3	4·5	6·8
Mare (ditto)	0·8	..	1·62	8·75 (only 3·7 according to Young)	10·39

From these analyses it would appear that milk is a compound fluid, chiefly consisting of oleaginous and albuminous materials, with different salts.

According to Dr. Prout, 'albuminous and oleaginous principles may be considered already fitted for the purposes of the animal economy, without undergoing any essential change in their composition.' And thus, by the action of the organs of the parent, the food is brought into a state very favourable for its assimilation in the body of the young, without taxing severely the digestive organs of the latter. The salts present in the milk serve also important uses, especially the phosphate of lime by consolidating the bones which, at the time of birth, are soft and cartilaginous. The period when lactation in the human offspring should cease must vary with the vigour and progress of development of the infant; but in general nine months is the proper time for suckling, and its continuance beyond that period is injurious both to parent and child.

The milk of cows or other animals is extensively used as the food even of adults, and, though insufficient alone, is a most valuable ingredient of diet. It is often enjoined as the food of invalids, especially of persons who have a tendency to consumption.

Milk is also used as an antidote in cases of poisoning by some metallic salts, such as corrosive sublimate, perchloride of tin, sulphate of copper, &c.

Though cheese is in general difficult of digestion, fresh-pressed curd is often found to suit the stomach of persons affected with disease of that organ. (See Abercrombie, *On Diseases of the Stomach.*)

Milk may be brought to a dry state, and powdered, in which condition it keeps for a length of time; and by dissolving it in tepid water an artificial milk may be formed, capable of being used at sea, particularly for children during long voyages.

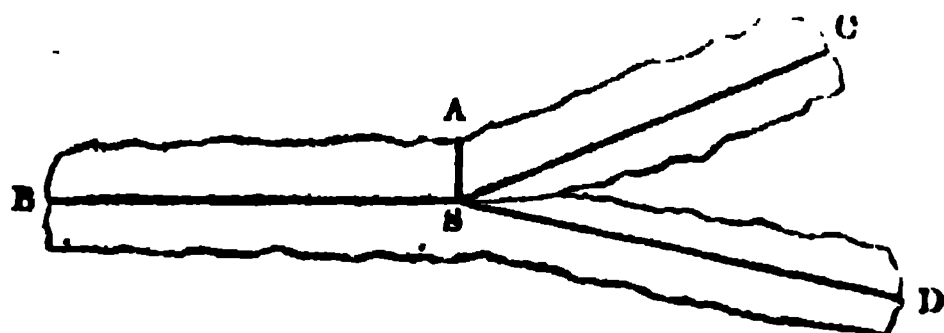
(See Mr. Pereira's 'Lectures' in the *Medical Gazette.*)

MILKY WAY. It is desirable, in describing astronomical objects, to keep as close as possible to the words of those who are accustomed* to the sight and description of such things. Two passages in Sir John Herschel's 'Astronomy' (pp. 163, 375, 376, Lardner's *Cyclopædia*, No. 43) will describe the Milky Way, and the theory of it, by Sir William Herschel, with excellent brevity and distinctness.

'There are not wanting *natural* districts in the heavens, which offer great peculiarities of character, and strike every observer: such is the Milky Way, that great luminous band which stretches, every evening, all across the sky, from horizon to horizon, and which, when traced with diligence, and mapped down, is found to form a zone, completely encircling the whole sphere, almost in a great circle, which is neither an *hour* circle nor coincident with any other of our astronomical *grammata*. It is divided in one part of its course, sending off a kind of branch, which unites again with the main body after remaining distinct for about 150°. This remarkable belt has maintained, from the earliest ages, the same relative situation among the stars; and when examined through powerful telescopes, is found (wonderful to relate!) *to consist entirely of stars scattered by millions*, like glittering dust on the black ground of the general heavens.

'If the comparison of the apparent magnitudes of the stars with their numbers leads to no general conclusion, it is otherwise when we view them in connection with their local distribution over the heavens. If indeed we confine ourselves to the three or four brightest classes, we shall find them distributed with tolerable impartiality over the sphere; but if we take in the whole amount visible to the naked eye, we shall perceive a great and rapid increase of number as we approach the borders of the Milky Way. And when we come to telescopic magnitudes,' or stars of so small a magnitude as to be invisible except through a telescope 'we find them crowded, beyond imagination, along the extent of that circle, and of the branch which it sends off from it; so that in fact its whole light is composed of nothing but stars, whose average magnitude may be stated at about the tenth or eleventh.

'These phenomena agree with the supposition that the stars of our firmament, instead of being scattered in all directions indefinitely through space, form a stratum, of which the thickness is small, in comparison with its length and breadth; and in which the earth occupies a place somewhere about the middle of its thickness, and near the point where it subdivides into two principal laminæ, inclined at a small angle to each other. For it is certain that to an eye so situated, the apparent density of the stars, supposing them pretty equally scattered through the space they occupy, would be least in a direction of the visual ray (as S A) perpendicular to the lamina, and greatest in that of its breadth, as S B, S C, S D; increasing rapidly in passing from one to the other direction, just as we see a slight haze in the atmosphere thickening into a decided fog-bank near the horizon, by the rapid increase of the mere length of the visual ray. Accordingly, such is the view of the construc-



tion of the starry firmament taken by Sir William Herschel, whose powerful telescopes have effected a complete analysis of this wonderful zone, and demonstrated the fact of its consisting entirely of stars. So crowded are they in some parts of it, that by counting the stars in a single field of his telescope, he was led to conclude that 50,000 had passed under his review in a zone two degrees in breadth, during a single hour's observation. The immense distance at which the remoter regions must be situated, will sufficiently account for the vast predominance of small magnitudes which are observed in it.' [HERSCHEL; NEBULÆ.] But to the above it must be added, that the fifty thousand stars thus men-

* Many popular works on astronomy contain nothing but descriptions of descriptions, in which want of absolute plagiarism is no merit, but the reverse. We recommend the work cited to those of our readers who are not already acquainted with it, as that of an actual observer whose felicity of description is very notorious among those who are in the habit of viewing the celestial bodies.

tioned as contained in a zone of 15° by 2° include only those which could be steadily seen and distinctly numbered; besides which, twice as many more were suspected, of which only occasional glimpses could be got for want of sufficient light.

The Milky Way may be described in general terms as extending three or four degrees on each side of a great circle inclined at an angle of about 60° to the ecliptic, which it cuts in the northern hemisphere between the horns of Taurus and the feet of Gemini, and in the southern hemisphere between Sagittarius and Scorpio. Beginning with the part nearest to the North Pole, it nearly covers Cassiopea and Perseus, and then, becoming thinner, passes through Auriga, between Taurus and Gemini, and near the back of Canis Major through Argo. It then narrows considerably, and passing under the hind feet of Centaurus, widens again near Ara. A little above the last constellation, and before it again meets the ecliptic, it divides into the two streams above mentioned, which contain between them a long thin strip passing through part of Scorpio, Serpens, Aquila, Vulpecula, and Cygnus. In Cygnus the streams reunite, but immediately separate again, finally reuniting higher up in the same constellation, from whence the main stream reaches Cassiopea, &c.

The Milky Way was called by the Greeks γαλαξίας, or κύκλος γαλακτικός (whence our word *Galaxy*), and by the Romans *Orbis lacteus*. The mythology of the former people on the subject is as edifying as usual: Hyginus fixes on Eratosthenes the most common story, namely, that the Galaxy arose from the milk of Juno, who pushed Hercules away from her breast (where he had been placed by Jupiter) on learning that he was the son of Maia. Nor does the above accurate writer forget to mention that others held the appearance to have arisen from young master Hercules having been a greedy child, and having filled his mouth too full. Others thought that the whole was not milk, but ears of corn which Isis dropped in her flight from Typhon. Another fable, mentioned by Plato, makes the Milky Way to be a broad causeway through the heavens for gods and heroes to walk upon; another, that it is the part of the heaven which was singed when the horses of the sun ran away with Phaeton. These stories are a proper prelude to the speculations of the philosophers which followed. Some of the Pythagoreans are reported to have supposed the Milky Way to be an old and disused path of the sun, out of which, some said, he was frightened by the banquet of Thyestes; others, a reflexion from the sun. Anaxagoras is said to have thought it was the shadow of the earth: Aristotle supposed it to be sublunary, and to consist of exhalations, of the same matter as comets. Posidonius took it for a band of fire; Theophrastus for a solid and luminous band, joining together the two hemispheres; while Diodorus thought it was celestial fire shining through the clefts of the solid heavens. Democritus hit the true explanation, namely, that it is a congeries of little stars too small to be separately seen—an opinion which both Plutarch (*De Placit. Philos.*, l. iii., c. 1) and Manilius mention. Shortly after the invention of the telescope, Galileo announced that he had resolved the whole of the Milky Way into stars. 'Est enim *Galaxia* nihil aliud quam *innumerarum stellarum coacervatim consitarum congeries*: in quamcunque enim regionem illius perspicillum dirigas, statim stellarum ingens frequentia sese in conspectum profert quarum complures satis magnæ et valde conspicuæ videntur, sed exiguarum multitudo prorsus inexplorabilis est.' (*Nuncius Sidereus.*) It is however not easy to suppose that Galileo's resolution of the Milky Way was complete; and we may here see how necessary is attention to minute description. When Sir J. Herschel, in the paragraph cited above, states the stars to appear 'like glittering dust *on the black ground of the general heavens*,' we know that, if the observer can be depended upon, he has completely resolved the continuous light in question: but if he only says, with Galileo, that he detected innumerable stars, we are only sure that he has distinguished the nearer stars, and may suppose that the more distant ones still formed a Milky Way behind them. That this must have been the case with Galileo (whose telescopes would never distinctly show Saturn's ring) may be confidently asserted. It must also be remembered that Galileo had completely resolved several nebulæ, and might easily have completed his assertion as to the Milky Way from analogy. Kepler ('Dioptr. Pref.') describes this resolution in a way which will be some guide as to its character: 'Nebulosa stella ostendit, ut in Via Lactea, duas, tres, vel quatuor clarissimas stellas in arctissimo spatio collocatas;' that is, two, three, or four stars were seen in the smallest space: this may very well correspond to Sir W. Herschel's estimate of 50,000 in the zone above mentioned, without the necessity of supposing that those stars were seen, which the forty-foot reflector would only show by glimpses. Sir W. Herschel counted seventy-nine stars, on the average, in a field of fifteen minutes in diameter, showing about as much of the heavens as is covered by one-fourth part of the moon. If, which may be suspected, the 'arctissimum spatium' of Kepler meant the field of his telescope, the resolution thus obtained would not quite justify the conclusion, except as a probable deduction; the real and necessary inference would only have been, that stars invisible to the naked eye exist in every part of the Milky Way in considerable numbers.

MILL, JOHN, was born at Shap, in Westmoreland, about 1645. In 1661 he entered as servitor at Queen's College, Oxford, took his degree of B.A. in 1666, of M.A. 1669, and was shortly afterwards chosen a fellow and tutor of his college. In 1676 he was made chaplain to Dr. Lamplugh, bishop of Exeter, and in 1681 obtained the rectory of Blechingdon, in Oxfordshire, and was appointed chaplain to Charles II. In 1685 he was appointed principal of St. Edmund's Hall, which office he held till his death, which happened June 23rd, 1707.

Mill is known by his valuable edition of the Greek Testament, which was published only fourteen days before his death, with the following title: 'Novum Testamentum Græcum, cum Lectionibus variantibus, MSS. Exemplarium, Versionum, Editionum, SS. Patrum et Scriptorum Ecclesiasticorum, et in easdem Notis.' This edition, which was the labour of thirty years, was originally begun by the advice of Dr. Fell, bishop of Oxford, and reflects the greatest credit on the diligence and critical acumen of its learned editor. He inserted the various readings that had been previously collected, procured extracts from several then uncollated MSS., and added many readings from the antient versions and the writings of the fathers. Mill however made no change in the text, which was merely a reprint of Robert Stephens's edition of 1550. These various readings, which amounted to more than 30,000, were attacked by Dr. Whitby, in 1710, in a work entitled 'Examen Variantium Lectionum Johannis Millii;' in which he maintained that a collection of so many various readings tended to unsettle the text of the New Testament, and to introduce doubt and uncertainty into the whole system of biblical interpretation. Dr. Whitby's arguments were applied by Antony Collins, in his 'Discourse on Free-thinking,' against the authority of the New Testament; whose work was answered by Bentley, a personal friend of Mill's, under the signature of Phileleutherus Lipsiensis.

The edition of the Chronicle of Malala, published at Oxford, in 1691, which is frequently said to have been edited by Mill [BENTLEY], was merely published under his superintendence, since the printing of the work was finished under the revision of Chilmead. [MALALA.]

MILL, JAMES, was born at Montrose, on the 6th of April, 1773. He is said to have received the early part of his education at the grammar-school of Montrose. However this may be, he was, subsequently at least, educated in the house of Sir John Stuart (originally Belcher), who was for a long time member of parliament for Kincardineshire. Mr. Mill was sent to the university of Edinburgh, where he was educated for the church and where he distinguished himself as a Greek scholar. Metaphysical and ethical philosophy also occupied a great part of his time at the university. He was a favourite of Dalzel, the then Greek professor in Edinburgh, who recommended him as a tutor to the Marquis of Tweedale. He was licensed to preach about 1798. By the advice of a friend he changed his views, and in 1800 accompanied Sir John Stuart to London, where he settled. He became editor of 'The Literary Journal,' a review, which supported him for some time, but was discontinued in consequence of the smallness of the sale. Mr. Macdiarmid, and Dr. T. Thomson, professor of chemistry in the university of Glasgow, were the chief contributors. He afterwards employed much of his time in writing for periodical publications; and for several years he was an occasional contributor to the 'Edinburgh Review.' He married soon after he had settled in London. His acquaintance with Mr. Bentham commenced at an early period of his residence in the metropolis.

His 'History of British India' was commenced about 1806, but being a work of great labour, and the author being obliged to devote a considerable portion of his time to other avocations, it was not published till the winter of 1817-18. It is perhaps no very high praise of this work to say that it is not only the best history of British India, but the only single work calculated to convey to the general reader any clear and connected view of India and Anglo-Indian affairs. But it possesses higher claims than these. It is admitted by some of the most eminent of those who have administered Indian affairs for the last ten years, that Mr. Mill's work was the beginning of sound thinking on the subject of India; and the measures of government in that country are stated by those who have the best means of knowing, to be now bearing every year more and more the impress of his views. The style of Mr. Mill's history has been represented by some as dry and unattractive. Mr. Mill certainly does not deal much in rhetorical ornament, at least in what is usually considered such by modern writers, for his style reminds us more of the nervous simplicity and terseness of some of the antient masters of the difficult art of writing, than that of any modern except Hobbes. The reader who is really in search of a meaning will find it in the writings of Mr. Mill with far less labour than where it is to be sought for in a crowd of unapt and unnecessary words. These remarks may be said to be applicable rather to Mr. Mill's philosophical than to his narrative style. But although not possessing narrative powers of the same kind as Sir Walter Scott or even David Hume, there are passages of Mr. Mill's history which will interest many readers as much as the most spirit-stirring romance; for instance, his account of some of the actions of Clive, and of Cornwallis's night attack upon the outworks of Seringapatam. His narrative of military operations is good; clearness, in which Mr. Mill excels, being the principal quality required. And some of his characters, that of Clive in particular, are drawn in a few bold and forcible lines, which engrave them on the mind of the reader.

In consequence of the ability and knowledge of the subject displayed in his history, and although he had in some parts of it freely censured the conduct of the East India Company, the Court of Directors, in the spring of 1819, introduced him into their home-establishment, and intrusted to him the chief conduct of their correspondence with India in the revenue branch of administration. He afterwards rose, in the course of promotion, to be head of the department in the India House of correspondence with India.

About three years before his appointment to his office in the India House, Mr. Mill became a contributor to the 'Supplement to the Encyclopædia Britannica,' his principal contributions to which were the articles on Government, Education, Jurisprudence, Law of Nations, Liberty of the Press, Colonies, and Prison Discipline. These essays were reprinted in a separate form, and are probably the best known of Mr. Mill's productions. They exhibit great powers both of analysis and ratiocination, and have produced, we believe, more marked effects than any other, not only of the works of Mr. Mill, but of any other writer of this age on such subjects, on the minds of his contemporaries.

His 'Elements of Political Economy,' whatever may be its merits or demerits, and it made no pretensions to originality, published in 1821-2, has at least the very great merit of being written with his usual clearness and precision of language.

In 1829 he published his 'Analysis of the Phenomena of the Human Mind,' a work on which he bestowed more of the labour of thought than on any other of his productions. In this work Mr. Mill has attempted to resolve all the powers of the human mind into a very small number of simple elements. From an examination of a number of the more complicated cases of consciousness, he arrives at the conclusion that they all resolve themselves into three simple elements—sensations, ideas, and the train of ideas. He thus explains what he means by the terms *sensations* and *ideas*. 'We have two classes of feeling: one, that which exists when the object of sense is present; another, that which exists after the object of sense has ceased to be present. The one class of feelings I call sensations; the other class of feelings I call ideas.' (*Analysis of the Phenomena of the Human Mind*, vol. i., p. 41.) Mr. Mill begins with the simpler, and thence proceeds to the exposition of the more complex phenomena. 'The feelings,' he says, 'which we have through the external senses are the most simple, at least the most familiar, of the mental phenomena. Hence the propriety of commencing with this class of our feelings.' (*Analysis*, vol. i., p. 1.) Accordingly, he begins with sensation, under which head he ranges the feelings which we have by the five senses—smell, taste, hearing, touch, and sight. 6, Sensations of disorganization, of the approach to disorganization, in any part of the body. 7, Muscular sensations, or those feelings which accompany the action of the muscles. 8, Sensations in the alimentary canal. He next proceeds to ideas, or the copies or images of sensations. He then treats of ideas put together or associated in trains, and of the order of their association and the causes of that order. Before proceeding to the exposition of the more complex ideas or clusters of ideas, he finds it necessary to explain the process of naming, or language; that process by which the sensations and ideas of one man are communicated to another, and by which likewise a record is preserved of sensations and ideas after they are passed. He then treats of consciousness and conception, which philosophers, he says, have erroneously created into what they called powers of the mind: whereas, he says, consciousness is merely a name applied to sensations, and to ideas whether simple or complex; to all the feelings of our sentient nature: and conception a name applied only to ideas, and to ideas only in a state of combination. But consciousness may surely be said to be the power of having sensations and ideas; and conception the power of having ideas in a state of combination.—In this sense, which is not at variance with Mr. Mill's explanation of them, both consciousness and conception may be called powers of the mind.

Again, imagination, he says, is the name of a *train* of ideas. 'I am said to have an imagination, when I have a train of ideas; and when I am said to imagine, I have the same thing; nor is there any train of ideas to which the term imagination may not be applied.'

'There is great diversity of trains. Not only has the same individual an endless variety of trains, but a different character belongs to the whole series of trains which pass through the minds of different individuals or classes of individuals. The different pursuits in which the several classes of men are engaged render particular trains of ideas more common to them than other trains. One man is a merchant, and trains respecting the goods in which he buys and those in which he sells are habitual in his mind. Another man is a lawyer, and ideas of clients and fees, and judges and witnesses, and legal instruments and points of contestation, and the practice of his court, are habitually passing in his mind. Ideas of another kind occupy the mind of the physician; of another kind still the mind of the warrior. The statesman is occupied with a train different from that of any of the classes that have been mentioned, and one statesman with a very different train from another, according as his mind is running upon expedients which may serve the purpose of the day, or arrangement which may secure the happiness of the population from generation to generation. A peculiar character belongs to the train which habitually occupies the mind of the mathematician. The mind of the metaphysician is also occupied by a train distinguished from that of other classes. And there is one man yet to be mentioned, the poet, the peculiarity of whose trains has been a subject of particular observation. To such a degree indeed have the trains of the poet been singled out for distinction, that the word imagination, in a more restricted sense, is appropriated to them. We do not call the trains of the lawyer, or the trains of the merchant, imagination. We do not speak of them as imagining when they are revolving each the ideas which belong to his peculiar occupation; it is only to the poet that the epithet of imagining is applied. His train or trains analogous to his are those which receive the name of imagination.' (Vol. i., p. 179.)

In some parts of his book Mr. Mill has, we think, been led into error, in part probably by carrying his notion of association as an explanation of these phenomena too far. Thus in the chapter on classification, after very ably showing how long men had been led away by mere jargon from the real nature and object of classification, he says, 'Man first becomes acquainted with individuals. He first names individuals. But individuals are innumerable; and he cannot have innumerable names. He must make one name serve for many individuals.' After then alluding to the case of 'synchronous sensations so concreted by constant conjunction as to appear, though numerous, only one; of

which the ideas of sensible objects, a rose, a plough, a house, a ship, are examples'—he thus proceeds: 'It is easy to see wherein the present case agrees with and wherein it differs from those familiar cases. The word man, we shall say, is first applied to an individual; it is first associated with the idea of that individual, and acquires the power of calling up the idea of him; it is next applied to another individual, and acquires the power of calling up the idea of him; so of another, and another, till it has become associated with an indefinite number, and has acquired the power of calling up an indefinite number of those ideas indifferently. What happens? It does call up an indefinite number of the ideas of individuals as often as it occurs; and calling them up in close connection, it forms them into a species of complex idea.' (Vol. i., p. 204.) Mr. Mill then says there can be no difficulty in admitting this, 'because it is an acknowledged fact.' Mr. Mill himself furnishes what he considers the reason, for he says, 'It is also a fact that when an idea becomes to a certain degree complex from the multiplicity of the ideas it comprehends, it is of necessity indistinct. Thus, when the word man calls up the ideas of an indefinite number of individuals, not only of all those to whom I have individually given the name, but of all those to whom I have in imagination given it, or imagine it will ever be given, and forms all those ideas into one, it is evidently a very complex idea, and therefore indistinct.' (*Ibid.*)

Mr. Mill having gone through an exposition of abstraction, memory, belief, ratiocination, evidence, and some of the more complicated cases of naming, devotes the latter half of the second volume of his Analysis to the phenomena in which the sensations and ideas are to be considered as not merely existing, but also as exciting to action. He treats of pleasurable and painful sensations, and of the causes of the pleasurable and painful sensations; then of ideas of the pleasurable and painful sensations, and of the causes of them. He treats of wealth, power, and dignity, and their contraries, of our fellow-creatures, and of the objects called sublime and beautiful, and their contraries, contemplated as causes of our pleasures and pains. Chapter 22 is devoted to the subject of motives; and Chapter 24 to that of the will. Chapter 25 (the last) to intention. Mr. Mill's exposition of all these phenomena is mainly grounded on the law of association, by which he means simply the fact that the order of occurrence amongst our ideas is the order of occurrence amongst our former sensations, of which those ideas are the copies.

Mr. Mill's last work was the 'Fragment on Mackintosh,' published anonymously in 1835. This is a very severe criticism upon the 'Dissertation on the History of Ethical Philosophy,' contributed by Sir James Mackintosh to the 'Encyclopædia Britannica.' This work contains some very valuable disquisitions on morals, legislation, and jurisprudence, with some very clear and just remarks on the distinctions between these subjects, which are often confounded. Mr. Mill wrote several of the principal articles in the early numbers of the 'Westminster Review.' Among the contributions which are considered his best, are the article on the Formation of Opinions,' in No. XI., and the article on the Ballot, in No. XXV.

Mr. Mill died at Kensington, June 23, 1836.

MILLAR (Professor), JOHN, son of the Rev. James Millar, minister of the parish of Shotts, was born in that parish on the 22nd June, 1735. Two years after, his father was translated to the parish of Hamilton in the same presbytery, and young Millar was about the same time placed under the charge of his uncle, Mr. John Millar of Milhaugh, in the neighbouring parish of Blantyre. At the age of seven he was put by his uncle to the school of Hamilton, and thence sent to Glasgow college, where he distinguished himself by his diligence and attention. He was at first designed for the church; but while at college he adopted the resolution of studying for the bar. On leaving college he became preceptor to the eldest son of Lord Kames, in whose family he spent two years, during which he formed an intimacy with David Hume and other eminent individuals. On the 9th of February, 1760, Millar passed advocate (*Faculty Record*); but having undertaken at this early period of his life the cares and burden of a family, he was soon obliged to abandon his prospects at the bar, and an opportune vacancy having occurred in the chair of civil law in Glasgow college, he applied for and obtained that situation the following year (1761). He now devoted himself entirely to the duties of his new sphere, and by his conduct in it raised the class from a very low and languid condition to be the most popular of the law chairs in the kingdom. 'His manner was familiar and animated, approaching more nearly to gaiety than enthusiasm; and the facts which he had to state, or the elementary positions he had to lay down, were given in the simple, clear, and unembarrassed diction in which a well-bred man would tell a story or deliver an opinion in society. All objections that occurred were stated in a forcible, clear, and lively manner; and the answers, which were often thrown into a kind of dramatic form, were delivered with all the simplicity, vivacity, and easy phraseology of good conversation. His illustrations were always familiar, and often amusing; and while nothing could be more forcible or conclusive than the reasonings which he employed, the tone and style in which they were delivered gave them an easy and attractive air, and imparted to a profound and learned discussion the charms of an animated and interesting conversation.' (*Edinburgh Review*, vol. iii.*) But this was not all. It was also in no small degree owing to his practice of *examining* his pupils, and prescribing essays on subjects previously discussed in his lectures, that Millar acquired the high reputation as a professor of law which still attaches to his name. Every day before he began his address from the chair he endeavoured to ascertain by examination of his pupils whether they had followed his reasoning on the preceding day; and when the lecture was over he remained some time in the class-room to converse with such as were desirous of farther information. By engaging with them in an easy dialogue he removed obscurities and corrected misapprehensions; and the students were accustomed to acknowledge that it was at these meetings they derived the full benefit of the lectures. (Jardine's *Outlines of a Philosophical Education*, p. 463.) Mr. Millar had also the good fortune, as we may call it, of long having scarce any rival chair to contend with; for from the time of Mr. Erskine's resignation in 1765 onwards to the end of the year 1786, when Dr. David Hume was appointed, the chair of Scots law at Edinburgh was filled by Professor Wallace, who had too many employments to allow of his attention being devoted to any. Such accordingly was the success which attended Mr. Millar's prelections, that his pupils rapidly increased in number, and the professor of civil law in the Edinburgh college, after seeing his students proportionally diminished, was obliged to abandon the practice, which had till then prevailed in his class, of lecturing in Latin, with the hope of retaining the remainder.

Although most of his lectures were attended with interest, yet remarking a more than ordinary degree of attention manifested to such of them as referred to the progress of society and government, Mr. Millar was induced from this circumstance to publish a short treatise on the subject. This he did in 1771, and the work was favourably received. Some years afterwards he began to turn his attention in a particular manner to the nature and origin of the English government; and in 1787 he published his 'Historical View of the English Government, from the settlement of the Saxons in Britain to the accession of the House of Stuart.' This work is described as 'remarkable for the sagacity of its conjectures, the ingenuity of its explanations, the boldness of its discussions, and the total freedom from prejudice; but it is deficient in accuracy and research, and will not bring conviction to a mind that has received its first impressions from the plausible but delusive representations of Hume.' (*Edinburgh Review*, xxx., 166-7.)

Mr. Millar was in stature about the middle size; his person was athletic, and his countenance very animated and expressive. He continued in good health till about the end of the year 1799, when he was seized with an inflammatory complaint, from which however he in a certain degree recovered; but having about a year and a half after exposed himself to cold, he was seized with a pleurisy, of which he died 30th May, 1801.

MILLE'NNIUM, a Latin word meaning a period of a thousand years, is applied by ecclesiastical writers to the period during which it is predicted in Scripture that the Church will be in a state of extraordinary prosperity, and which is to be preceded by the overthrow of her enemies, accompanied at its commencement by the first resurrection, or the resurrection of the saints, and followed by the destruction of Gog and Magog, and the general judgment. (*Rev.* xx).

* The elaborate article of which the above quotation is a part has for its reputed author Francis Jeffrey, who is supposed to have been a pupil of Professor Millar's.

Respecting the state of the church during the Millennium two opinions are held, both of which can be traced up nearly to the earliest ages of Christianity. The one is that Christ will reign in person upon the earth at Jerusalem, that the saints will reign with him and enjoy corporeal pleasures, and that the Jews will be restored to Palestine and exalted to the first rank among the nations of the world. This doctrine was held by Irenæus and others of the earlier fathers, not merely as their own opinion, but as the faith of the church received from the Apostles. These tenets were also held by Lactantius, who expected the Millennium to commence very soon after the time at which he lived. On the other hand it was held by Jerome and other fathers, who warmly opposed the doctrines just mentioned, that the passages of scripture on which they are founded must be taken in an allegorical sense, and that the Millennium will only be distinguished by the universal diffusion of pure Christianity in the world, and a consequent decrease of physical and moral evil. This opinion was adopted as the belief of the orthodox church, and has been almost universally received in modern times. The followers of the late Rev. Edward Irving and some other small sects, as well as many individuals among other bodies of Christians, still hold the doctrine of the personal reign of Christ on earth. Such persons are commonly called Millennarians, the name applied in the early ages of the church, together with the corresponding Greek word Chiliasts, to those who held these opinions. (Lardner's *Credibility*; Middleton's *Free Enquiry*, page 46.)

MILLEPO'RIDÆ. In the Linnæan 'Systema Naturæ' the genus Millepora included fourteen species of solid corals perforated with conical non-lamelliferous pores. Several of these have been taken as types of new genera or subgenera, and, according to the general practice of modern zoology, the Linnæan genus is transformed into a great family. Lamarck (*Anim. sans Vertèbres*, 11) places many of the Millepores in his fourth section of Polyparia, the foraminated corals, with Catenipora and Tubipora, which belong to other groups. The Milleporidæ form a distinct order in the Foraminated Polypiaria of Lamouroux (*Expos. Méthod.*), and include no less than eighteen genera, viz.:—

Ovulites, Retepora, *Lunulites*, Orbulites, Ocellaria, Melobesia, Eudea, *Alveolites*, Theonea, Chrysaora, Millepora, *Terebellaria*, Spiropora, *Idmonea*. (Distichopora, Hornera, Krusensterna, and Tilesia are included among Milleporidæ in the table, but not in the body of the work.) The genera in Italics are fossil.

Lamouroux defines the Milleporidæ thus:—*Polyparia* stony, polymorphous, solid, internally compact; *cells* very small or poriform, scattered or in series, never lamelliferous, though the parietes are sometimes lightly striated.

Blainville collects the Milleporidæ into groups according to the form of the cells in the coral, and defines the family by characters drawn both from the animal and the stony support. *Animals* in general very slender, and provided with a single circle of slender tentacula; *cells* sometimes of considerable size, but always *without lamellæ or striæ* within or without the tubes; *polyparium* fixed, varying in shape. Retrenching from the group the palmated kinds (to form the genus Palmipora among the Madrephylliæa), there remain, according to Blainville, 23 genera, which are thus arranged:—

1. *Cells polygonal, often rather large.*—Favosites (Eunomia), Alveolites, Apsendesia, Theonea, Pelagia, Terebellaria, Polytrema, Frondipora, Lichenopora.
2. *Cells round, very fine, poriform, immersed.*—Orbiculites, Marginopora, Stromatopora, Tilesia, Spinopora, Chrysaora, Ceriopora, Distichopora, Heteropora.
3. *Cells round, more or less tubular.*—Pustulopora, Hornera, Idmonea, Cricopora.

The following are the principal characters of these genera:—

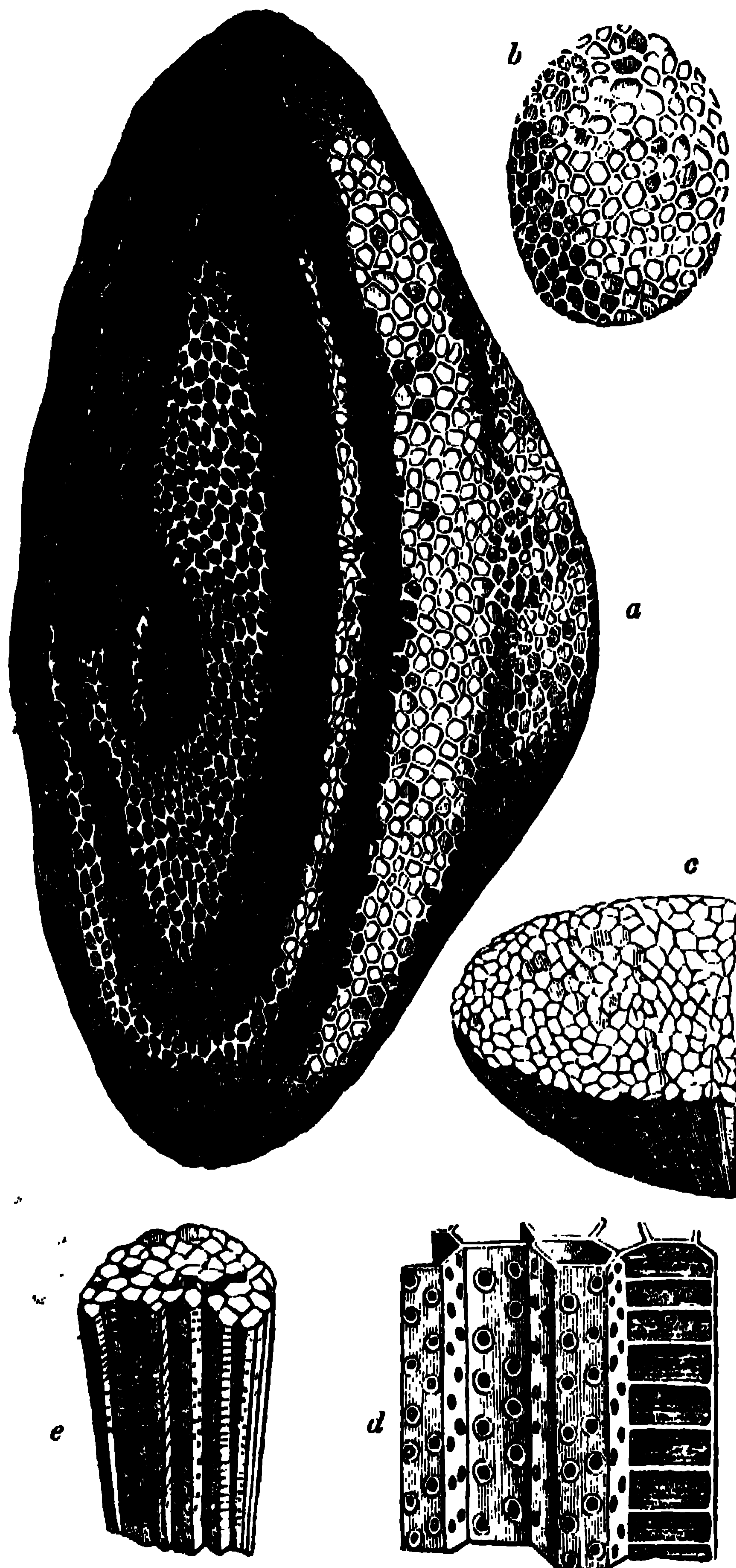
§ 1. Cells polygonal.

Favosites.—*Animals* unknown; *cells* prismatic, contiguous, vertical or diverging, the parietes pierced with pores, the cavity divided by transverse septa; *polyparium* branched or massive, sometimes basaltiform.

A genus of Lamarck; Goldfuss added to the knowledge of its structure, but changed its name to Calamopora. Blainville thinks Eunomia of Lamouroux may be included in it, but the descriptions are unlike. Ehrenberg places it near Astræa, in the family of Madrephylliæa, and we think with reason.

The Favosites are only known in a fossil state, and, we believe, only in strata of the 'Transition' and carboniferous eras, in the former of which they are specially abundant, in the Eifel, Siluria, at Dudley, &c.

Example, Favosites Gothlandica. (Goldfuss, t. 26, f. 3.)



Favosites Gothlandica.

a, b, two specimens; *c*, nuclei of the tubes; *d*, tubes magnified; *e*, portion of a vertical section.

Eunomia.—*Animals* unknown; *cells* tubular, long, parallel, internally sulcated longitudinally, and transversely annulated; the parietes thick and solid. (Lamouroux, *Expos. Méthod.*)

The only species, Eunomia radiata, is fossil in the oolitic series of Caen.

Alveolites.—*Animals* unknown; *cells* short, tubular, prismatic, alveoliform, the parietes thin; polyparium formed into reticulated layers, enveloping each other.

A genus of Lamarck, subsequently, but without sufficient reason, reunited by Goldfuss to Favosites, under the name of Calamopora.

Two living species and a few fossils, chiefly from the tertiary series of Dax. Blainville includes in the genus (not correctly) many of the Calamopora of Goldfuss which are to be ranked as Favosites.

Frondipora.—*Animals* unknown; *cells* unequal, subpolygonal, accumulated irregularly, prominent only on the external surface of a finely branched *polyparium*, which is fixed, arborescent, variously reticulated, and longitudinally striated on the non-celluliferous face.

One of the species is ranked as a Retepora by Lamarck.

Lamouroux (following Tilesius) calls it Krusensterna. The species are recent in the seas of Kamtchatka and the Mediterranean.

Example, Frondipora reticulata. (Blainv., pl. 69, f. 1.)

Lichenopora.—Animals unknown; *cells* rather large, poriform or subtubular, subpolygonal, accumulated and scattered on the interior surface of a fixed orbicular, cupuliform polyparium, which is quite smooth externally.

A genus of Defrance, including one recent and three fossil species from the cretaceous and tertiary strata.

Example, Lichenopora turbinata. (Blainv., pl. 68, f. 4.)

Theonea.—Animals unknown; *cells* rather large and deep, subpolygonal, accumulated irregularly, prominent on the tumid or angulated face of the polyparium, which is fixed, irregularly lobed, and more or less lacunose between the accumulations of pores.

Example, Theonea clathrata (Lamouroux, pl. 80, f. 17), from the oolite of Caen.

Apsendesia.—Animals unknown; *cells* subpolygonal, small, poriform, irregularly disposed, occupying the upper and external edge of sinuous ridges, smooth on one side, plaited on the other; *polyparium* globular or hemispherical, diverging from the base to the circumference.

A genus of Lamouroux, from the oolite of Caen.

Example, A. dianthus. (Blainv., pl. 59, f. 2.)

Terebellaria.—Animals unknown; *cells* small, oval, subtrigonal, quincuncially arranged on the surface of the *polyparium*, which is composed of short conical apparently twisted branches.

This beautiful coral, thus characterised, is found in the oolite of Caen, and, it is believed, also abundantly near Bath. Perhaps only one species is known, which Lamouroux divides into two.

Example, Terebellaria ramosissima. (Lamour., pl. 82, f. 1, *a*.)



Terebellaria ramosissima.

Pelagia.—Animals unknown; *cells* subpolygonal, close, irregular, occupying the convex edge of numerous vertical ridges, disposed in a radiating form, and either simple or dichotomous, on the upper surface of the coral; *polyparium* free, fungiform, excavated and lamelliferous above, convex, pedunculated, and circularly wrinkled below.

Example, Pelagia clypeata. (Lamour., pl. 79, f. 5, 6, 7.) From the oolite of Caen.

Polytrema.—Animals unknown; *cells* poriform, polygonal, irregular, unequal, numerous, occupying the knotty branches of a small fixed *polyparium*.

A genus of Risso.

Example, Polytrema miniaceum. (Blainv., pl. 69, f. 4.)

§ 2. Cells rounded, poriform.

Orbitolites.—Animals unknown; *polyparium* a regular, orbicular, discoid, cellular, cretaceous mass; *cells* in two layers, sometimes apparent externally, and especially at the margin, which is thickened.

A genus of Lamarck, apparently founded upon an *internal coral*. One recent European species, and several fossils from the chalk and tertiaries of Europe, are mentioned.

Example, Orbitolites complanata. (Blainv., pl. 72, fig. 2.)

Marginopora.—Animals unknown; *cells* poriform, excessively small, round, close, situated in the narrow tortuous folds of the circumference of the *polyparium*, which is free, irregular, discoid, thickened at the margin, and concentrically striated on both surfaces.

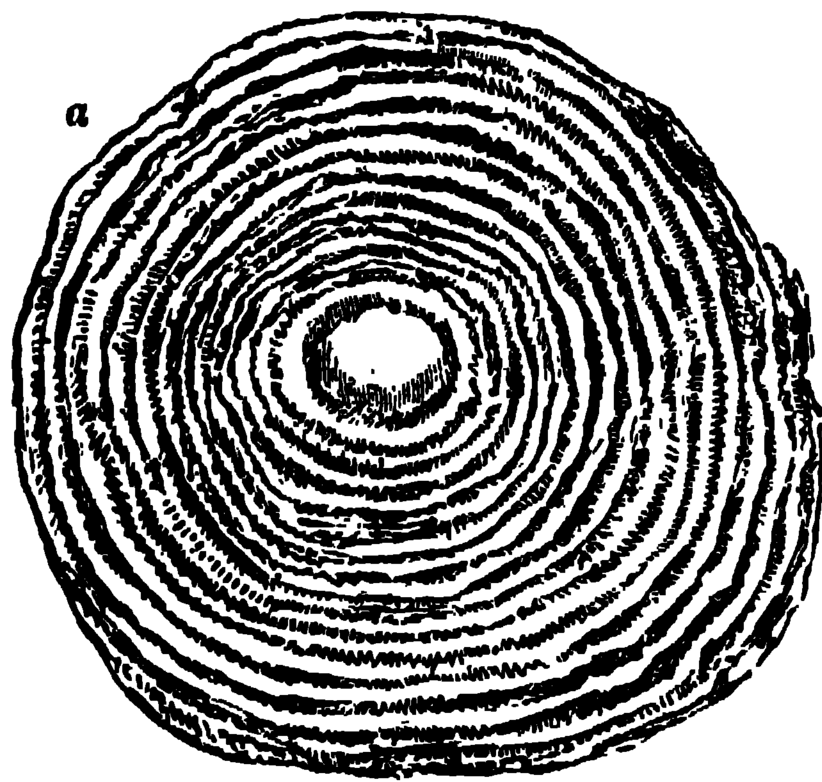
(Probably an internal coralline plate.)

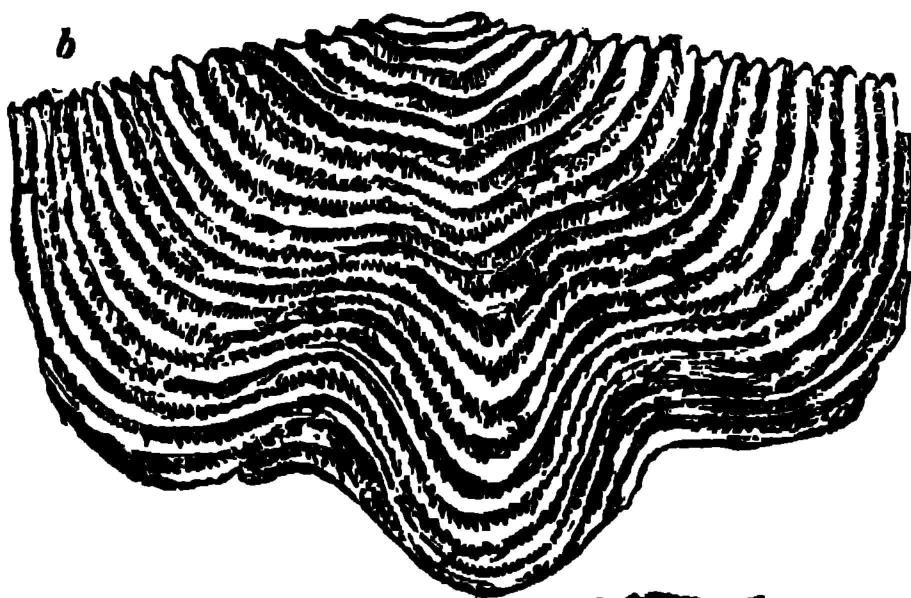
Example, Marginopora vertebralis. (Blainv., pl. 69, f. 6.)

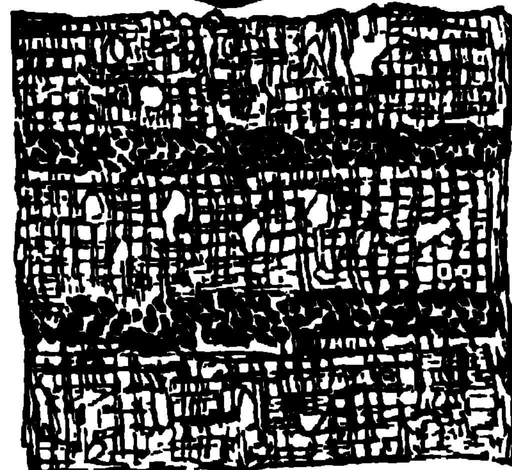
Stromatopora.—Animals unknown; *polyparium* hemispherical or subglobose, formed of alternately solid and porous adherent superposed layers.

The character is from Goldfuss, the author of the genus. The cells are very small, the external surface concentrically wrinkled. The species are fossil in the 'Transition' limestone, &c. of the Eifel, Siluria, Dudley, &c. Mr. Lonsdale has described a new species similar to a Nummulite in figure.

Example, Stromatopora concentrica. (Goldfuss, 'Petrifacta Europæ,' tab. 8.)







Stromatopora concentrica.

a, surface reduced; *b*, vertical section reduced; *c*, portion highly magnified.

Ceriopora.—Animals unknown; *cells* poriform, round, close, irregularly distributed in concentric layers; *polyparium* polymorphous, often globular or lamellar.

This genus was established by Goldfuss, but is curtailed by a stricter definition, by Blainville, to suit fossils which appear in the chalk of Maestricht and the 'Transition' rocks of Bamberg.

Example, Ceriopora micropora. (Goldfuss, t. 10, f. 4.)

Chrysaora.—Animals unknown; *cells* periform, very fine, with a round opening, accumulated on the intervals of ridges, which anastomose on the surface of the fixed irregularly ramose *polyparium*.

A genus of Lamouroux, to which Blainville refers many of the Ceriporæ of Goldfuss, which belong to the oolitic formations.

Example, Chrysaora spinosa. (Lamour., pl. 81, f. 6.)

Tilesia.—Animals unknown; the *polyparium* formed of tortuous, verrucose, cylindrical branches; *cells* small, accumulated in irregular patches which project above the general surface, and are separated by smooth intervals.

Example, Tilesia distorta. (Lamour., pl. 74, f. 5, 6.) From the oolite of Caen.

Spinopora.—Animals unknown; *polyparium* adherent by a concave concentrically striated face below; above reticulated, tuberculated, and bearing between the tubercles poriform cells.

Fossil from the chalk. Three species.

Example, Spinopora mitra. (Blainv., pl. 70, f. 3.)

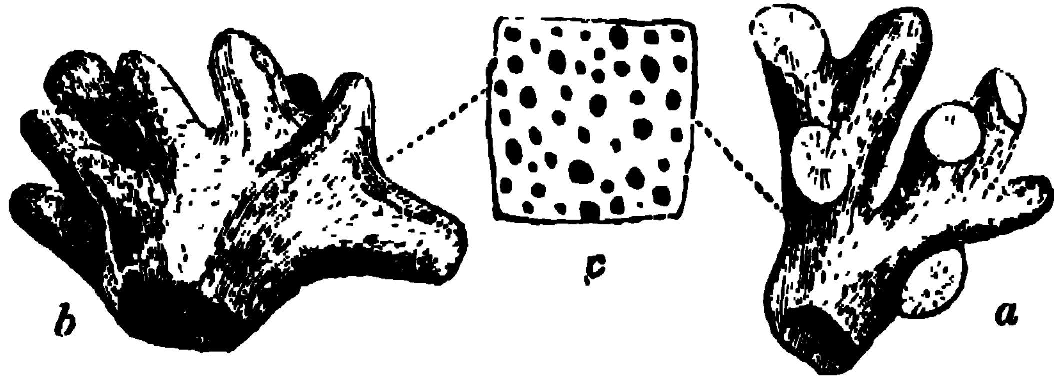
Distichopora.—Animals unknown; *cells* of two kinds, some stelliform, scattered, superficial, shallow; the others poriform, deep, unequal, forming three lateral rows on each side of the branches of an arborescent *polyparium*; these branches are compressed, obtuse, subflexuous, and tubulose within.

This Lamarckian genus contains the Millepora violacea of Linnæus. (Blainv., pl. 55, f. 2.)

Heteropora.—Animals unknown; *cells* round, poriform, completely immersed, of two sorts; some, larger than the others, are regularly dispersed on the whole surface of the *polyparium*, which is fixed, lobed, or branched, and formed of superposed laminæ.

A genus of Blainville, formed to include certain Cerioporæ of Goldfuss which have two sorts of pores.

Example, Heteropora cryptopora. (Goldfuss, t. 10, f. 3.)



Heteropora cryptopora:
a, b, two specimens; *c*. pores magnified.

Fossil from the chalk of Maastricht.

Mr. Lonsdale mentions one from the Silurian Rocks. (Murchison's *Silurian System*, p. 880.)

§ 3. Cells round, and more or less tubular and prominent.

Pustulopora.—Animals unknown; *cells* rather prominent, pustulose or mammellated, distant, with round openings; *polyparium* formed of superposed laminæ, cylindrical, digitiform, or a little branched, fixed.

The few fossils which have these characters are separated from the Cerioporæ of Goldfuss by Blainville. They are from the chalk and oolite.

Example, Pustulopora madreporacea. (Goldfuss, pl. 10, f. 12.)

Hornera.—Animals unknown; *cells* with a circular opening, prominent, detached, dispersed almost quincuncially on the inner face of the branches of a fragile ramulose *polyparium*, which is fistulose and furrowed on the nonpolypiferous face.

A genus of Lamouroux, formed from Retepora of Lamarck. It includes several living species, from the seas of Europe and Australasia, and more fossils, chiefly from the tertiary strata, but Mr. Lonsdale notices one from the Dudley limestone.

Example, Hornera frondiculata. (Lamour., t. 74, f. 7, 8, 9.)



Hornera frondiculata.
a, natural size; *b, c*, fragments of the upper and lower sides, magnified.

Idmonea.—Animals unknown; *cells* prominent, subconical, distinct, with a circular opening, arranged in half rings or short cross-lines, on two-thirds of the circumference of the branches of the *polyparium*, which is not porous, but slightly channelled on the non-celluliferous face; the branches are divergent and triquetral.

One living species belongs to this genus of Lamouroux, and several fossils from the oolite of Caen, and chalk and tertiaries of Maastricht and Paris. Goldfuss has included two of them among Reteporæ.

Example, Idmonea triquetra. (Lamour., pl. 79.) From the oolite of Caen.

Cricopora.—Animals unknown; *cells* tubular, rather prominent, with a circular opening, arranged in rings transversely or obliquely on the surface of a fragile *polyparium*, which branches into cylindrical parts obtuse at the extremity.

This genus was named Spiropora by Lamouroux, but it is only rarely that the cells take anything approaching to a spiral arrangement. The coral is *alveolar* through its mass. Some of the most characteristic species are fossils from Caen. C. Faujasii is from the chalk of Maastricht, and Blainville joins to the group two recent species, Seriatopora annulata and S. nuda (Lamarck). Ehrenberg calls the group Myriazoon, and Wiegmann Truncularia.

MILLER, SIR THOMAS, Baronet, second son of Mr. William Miller, writer to the signet, was admitted advocate at the Scottish bar in February, 1742, in the twenty-fifth year of his age. In 1748 he was constituted steward (or sheriff) of Kirkcudbright, and the same year elected joint principal clerk of the city of Glasgow. These offices he resigned in 1755, being then appointed solicitor to the excise in Scotland. In March, 1759, he was made king's solicitor-general: in April of next year, he was advanced to be lord advocate, soon after which he was returned to parliament. In November, 1762, he was chosen rector of Glasgow college. He continued in the post of lord advocate till April, 1766, when he was raised to the bench of the court of session, and succeeded Sir Gilbert Elliot, lord justice clerk, deceased; on which occasion he took his seat, by desire of the court, on the right hand of the lord president; and thence, on Dundas's death, he was, in January, 1788, elevated to the presidency of the court of Session, being the *first* lord justice clerk so promoted. The following month he was created a baronet. He died 27th September, 1789, leaving the present Sir William Miller, a judge in the court of session by the titular designation of Lord Glenlee, and other children.

It is to this distinguished person that the poet Burns alludes in these lines of his 'Vision:'—

'Through many a wild romantic grove,
Near many a hermit-fancied cove,
Fit haunts for friendship or for love,
In musing mood,
An aged judge I saw him rove,
Dispensing good.'

MILLER, JOHN MARTIN, born at Ulm (where his father was preacher in the cathedral and professor of Oriental languages), December 2, 1750, was a novelist, whose productions made a great sensation in Germany in the last century. At Göttingen, where he went to study theology, in 1770, he became acquainted with Voss, Holty, Bürger, the two Stollbergs, and other eminent literary characters of the time, and afterwards with Klopstock, whom he accompanied on his return to Hamburg. After taking orders, he was appointed preacher at the cathedral of his native town in 1783, and in 1797 professor of theology at the Gymnasium. In 1810 the king of Wirtemberg bestowed the deanery of Ulm on him; but he did not live to enjoy it many years, for he died on the 21st June, 1814.

Although now almost forgotten, his romance of 'Siegwart' (first published in 2 vols., 1776, shortly afterwards greatly enlarged, and in many parts re-written) had astonishing success. It called forth a host of imitators, and had also the distinction of being parodied. It was translated into French, Polish, Dutch, Danish, and Italian. Like his 'Siegwart,' his 'Karl von Burgheim' and other novels have little action or interest of story, but are distinguished by pure morality and an amiable though exaggerated sensibility. This excess of sensibility and sentiment, which however was merely caricatured by his professed imitators, qualified him well for an elegiac and lyric poet; and his productions of that class are distinguished by the tenderness and religious feeling which they breathe. His sermons are likewise compositions of no ordinary merit, attractive in style, eloquent, and impressive.

In his personal character he is said to have been rather cold and reserved, and therefore disappointed many who expected to find in the author of 'Siegwart' an impassioned enthusiast. His romances may be forgotten, but his poems never can.

MILLES, JEREMIAH, dean of Exeter, was the son of Jeremiah Milles, and nephew to Dr. Thomas Milles, bishop of Waterford and Lismore. Bishop Milles left his fortune to his nephew Jeremiah, who was born in 1714, and educated at Eton. He afterwards went to Corpus Christi College, Oxford, where he took the degree of M.A. in 1735, and that of D.D. in 1747. His uncle collated him to a prebend in the cathedral of Waterford, and presented him to a living near that city, which he held but a short time, choosing to reside in England. Upon his return he married Edith, the daughter of archbishop Potter, through whose means he obtained the united rectories of St. Edmund

the King and St. Nicholas Acon, in Lombard Street, with that of Merstham, in Surrey, and the sinecure rectory of West Terring, in Sussex. In 1762 Dr. Milles was nominated to the deanery of Exeter, on the advancement of Dr. Charles Lyttelton to the see of Carlisle, whom he also succeeded as president of the Society of Antiquaries in 1769. In the 'Archæologia' are several communications by him: particularly one entitled 'Observations on the Wardrobe Account of the Year 1483, wherein are contained the Deliveries made for the Coronation of King Richard the Third, and some other Particulars relating to that Monarch;' and another (*Archæol.*, vol. iv., p. 331-346), in which he joined the abbé Barthélemy in denying the genuineness of the Apamæan medal. Mr. Gough informs us that, while dean of Exeter, he formed a large collection of materials for the 'History of Devonshire.' His most unsuccessful literary attempt was to vindicate the authenticity of Rowley's Poems, in an edition which he printed, in 4to., in 1782. The dean died February 13, 1784.

(Nichols's *Literary Anecdotes*, vol. iv., pp. 471, 472; Chalmers's *Biogr. Dict.*, vol. xxii., pp. 168, 169.)

MILLET, a plant which botanists class among the grasses, though, in some species and in favourable situations, it attains the height of 18 or 20 feet. (Burckhardt's *Travels in Nubia*, p. 280.) The stalk of all the species of millet resembles a jointed reed, having at every joint a long broad leaf, which embraces the stalk with its base. The plants are all annuals, and grow quickly, yielding an abundance of small grains which are set round a compact spike at the top of the stalk. The stalk itself is filled with a saccharine juice.

Millet thrives best in a light sandy soil, and if sufficient space is allowed between the plants to weed and hoe them during their early growth, they will afterwards overtop and smother all weeds, and yield an abundant return with little labour and without much manure. The seeds however require a climate warmer and drier than that of England to ripen properly. Millet is cultivated largely in the southern parts of Europe—in Spain, Italy, the south of France, Switzerland, and Southern Germany; but it is grown most extensively in the East Indies, China, Arabia, Syria, Egypt, and Nubia. It has also been introduced into the West Indies, where it is called *Guinea corn*, and is used as food for the negroes.

In the East millet is used as food for men; but in Europe, though it is sometimes made into loaves and cakes, and frequently into puddings, it is mostly used for feeding poultry and domestic animals. The leaves and panicles are given, both green and dried, as fodder to cattle.

Millet has been described by botanists under the generic terms *Holcus* and *Sorghum*. The most general species, the common Indian millet (*Holcus Sorghum*, Linn.), known in Nubia by the name of *Durra*, is described under SORGHUM VULGARE. We briefly notice the most important of the other species:—

Black millet (*Holcus niger*, Arduino) is one of the largest species. Caffre millet (*Holcus Cafer*, Arduino) is a native of the Cape of Good Hope. Yellow-seeded millet (*Holcus saccharatus*, Linn.) is a native of the East Indies. Two-coloured millet (*Holcus bicolor*, Linn.) is said to be a native of Persia. Drooping millet (*Sorghum cernuum*) is cultivated in Arabia, Syria, and various parts of the Levant.

MILLIN, AUDIN LOUIS, born in 1758, was an eminent French antiquary, who succeeded Barthélemy as keeper of the antiquities and medals in the Royal Library at Paris. His 'Dictionnaire des Beaux Arts,' 'Dictionnaire de la Fable,' 'Monumens Antiques,' and 'Galérie Mythologique,' are all useful contributions towards archæology and the fine arts. Besides these works, his 'Magasin Encyclopédique,' which he carried on for twenty years without seeking any profit from it, was a highly valuable literary journal, and may now be regarded as a repository containing much important information. To the above may be added his 'Voyage dans les Départémens du Midi de la France,' 'Voyage dans la Savoie,' and 'Voyage dans le Milanais.' These works possess a permanent interest on account of the historical and antiquarian matter which they contain. He died August 14th, 1818.

MILLION. [NUMERATION.]

MILLSTONE-GRIT is the title of a remarkable group of strata which belong to the carboniferous system and separate the coal formation from the mountain limestone. It may be regarded as one of the many instances of 'transition' on a large scale, which reveal to the geologist local changes of level and position of the antient lands, whereby new currents were occasioned in the sea, and new depositions produced in its bed. Instead of the deposits of mountain limestone generated by processes almost purely marine, we have in the millstone-grit group evidence of streams from the interior of elevated lands and periodical currents which spread pebbles, sand, and clay, with land-plants, over surfaces where, previously, corals and shells were accumulated in the quiet sea. The character of this group varies according to a certain law of development, in passing from the south to the north of England. It is of little importance in the south-west of England, South Wales, or any of the midland coal-fields, but in Derbyshire it acquires great thickness, and appears in some of the most striking scenes of that romantic county. Here it is a series of thick arenaceous rocks, alternating with shales and flagstones below the coal and above the limestone. Perhaps no more remarkable feature in English geology can be noticed than the bold crags of millstone-grit which are crossed as the traveller proceeds from the coal of Sheffield to the limestone of Castleton.

Farther to the north, between the deep limestone dales of Yorkshire, the millstone-grit rocks appear on the summit of Ingleborough, Penyghent, and Wharnside, mixed with shales, limestones, ironstones, and beds of coal. At least three distinct bands of coarse pebbly millstone-grit here occur, though not in one hill, and a similar character belongs to the series in Durham and Northumberland. Through all the extreme north of England indeed the millstone-grit group passes by its coal, ironstone, &c. to the coal formation above, and by its limestones and peculiar shales to the mountain limestone below, by so easy a gradation that the whole appears one vast series of associated deposits.

The rock from which the group is named, the millstone-grit, is a very coarse-grained quartzose sandstone, with layers of pebbles, often defining the upper or under surfaces of beds, and sometimes (as near Keighley) containing remarkable masses of laminated mica, which is not common in the substance of the stone. The most coarse and quartzose parts of the stone have a vague resemblance to unmicaceous granites (as that of Ravenglass), and this is strengthened by the occasional abundance of felspar, in large masses crystallized within, but fragmented or worn to a pebbly aspect externally. This discloses probably the true history of the rock. It is a re-aggregated mass of the disintegrated materials of granite; and as almost every sandstone of the coal districts is liable to assume locally the coarseness of grain of the millstone-grit, and all appear to contain felspar grains and fragments (often decomposed to porcelain clay), the importance of a study of the millstone-grit becomes evident. The organic remains are a mixture of those belonging to the coal formation (plants) and those of the subjacent limestone (conchifera, mollusca).

MILNER, JOSEPH, was born in the neighbourhood of Leeds, on the 2nd of January, 1744. He was sent to the grammar-school at Leeds, where, by his industry and talents, among which a memory of most extraordinary power was conspicuous, he gained the warm regard of his instructor, the Rev. Mr. Moore, who resolved to have him sent to college. This plan was nearly frustrated by the death of Milner's father in very narrow circumstances; but by the assistance of some gentlemen in Leeds, whose children Milner had lately engaged in teaching, and by the offer of the office of chapel-clerk at Catherine Hall, Cambridge, he was enabled to enter that hall at the age of eighteen. In the year 1766 he took his degree of B.A., and gained the chancellor's second gold medal for classical knowledge. He now became assistant in the school, and afterwards the curate of the Rev. Mr. Atkinson, of Thorp Arch, near Tadcaster. Here he proceeded in the composition of an epic poem, entitled 'Davideis,' which he had commenced at Cambridge, and which he afterwards finished at Hull. It was submitted to Dr. (afterwards bishop) Hurd, who highly complimented the author on the talent it displayed, but advised him to defer its publication. Not long after he had obtained deacon's orders, Milner was elected head-master of the grammar-school, and afternoon-lecturer of the principal church of Hull. The school increased under his care. He not only introduced his younger brother to these literary pursuits in which he was afterwards distinguished [MILNER, ISAAC], but he also took his mother and two orphan children of his elder brother to live with him. About the year 1770 he embraced the sentiments of the

evangelical party in the church of England. This change in his religious views brought upon him neglect, and in some cases open opposition from many among the upper classes who had once been his admirers and friends; but his church was soon crowded with others, chiefly from the lower orders of the people, in whose sentiments and manners his preaching produced a striking change; and at length he not only recovered the esteem of his fellow-townsmen, but lived to see his own religious sentiments become so popular in the town that many of the pulpits of the churches were filled by his friends and pupils, and he himself was chosen vicar of Hull by the mayor and corporation. His election took place only a few weeks before his death, which happened on the 15th of November, 1797, in the 54th year of his age. For seventeen years before his death he had been vicar of North Ferriby, near Hull. A monument, executed by Bacon, was erected to his memory in the high church of Hull by several gentlemen who had been his pupils.

The excellencies of Mr. Milner's personal character were of the highest order. He was deeply pious, upright in all his conduct, singularly open and sincere, and kind, cheerful, and amusing in social life. In his political principles he was strongly attached to the established order of things in church and state.

The work by which he is best known is the 'History of the Church of Christ,' which was commenced by himself and completed by his brother, the dean of Carlisle, and which extends from the rise of Christianity to the Reformation. The first edition of this work appeared in 5 vols. 8vo., 1794 to 1812, and a second edition in 1810. It has been more than once reprinted. The plan of the history is thus stated in the author's Introduction: after stating that in all ages of the church there have existed 'men who have been *real*, not merely *nominal* Christians,' he proceeds:—'It is the history of these men which I propose to write. It is of no consequence with respect to my plan, nor of much importance, I believe, in its own nature, to what *external* church they belonged. I intend not to enter with any nicety into an account of their rites and ceremonies, or forms of church-government, much less into their secular history. Even *religious controversies* shall be omitted, except those which seem to bear a relation to the essence of Christ's religion, and of which the history of his real church requires some account. Let not the reader expect that the actions of great men (great in a secular view, I mean) will be exhibited to his notice. Nothing but what appears to me to belong to Christ's kingdom shall be admitted: genuine piety is the only thing which I intend to celebrate.' It is manifest that on this plan no *complete* church history can be written. Such a work ought assuredly to record the religious opinions and practices which have at any time prevailed among any of those who profess the Christian faith; leaving the reader to conclude, from these materials, which parties have been right and which wrong. But on Milner's plan we have avowedly the history of only one class of opinions, and the choice of this class is determined solely by their agreement with the sentiments of the author. Now, to say nothing of the temptation to do violence to facts, to which an author is exposed who is determined to trace the existence of certain principles in all ages of the church (a temptation from which it is but just to add that Milner has escaped), it is clear that, writing on this plan, two ecclesiastical historians of opposite creeds would produce works containing very different sets of facts, but each professing to be a 'History of the Church of Christ.' Though, for these reasons, Milner's work cannot be called a *complete* church history, its value as a *contribution* to church history is very great. It is written in that spirit of piety, and of deep interest in what the author believes to be true religion, which is not always found in our celebrated church historians; and for the very reasons which prevent its being complete, it contains many important facts which had previously been little attended to. It surpasses most other church histories in the use made of the writings of the Fathers, though the reverence which the author professes for those venerable men has led him to trust them too much.

The other works of Mr. Milner are,—1, 'Gibbon's account of Christianity considered; together with some Strictures on Hume's Dialogues concerning Natural Religion.' 2, 'Some Passages in the Life of William Howard.' 3, 'Essays on the Influence of the Holy Spirit.' 4, 'Tracts and Essays, Theological and Historical.' 5, 'Practical Sermons; with an Account of his Life, by the Dean of Carlisle,' 2 vols. A complete collection of his works was edited by the dean of Carlisle, 8 vols., 1810.

MILNER, ISAAC, dean of Carlisle, and brother of the preceding, was born in 1751. At the age of six he began to accompany his brother to the grammar-school at Leeds; but at his father's death his studies were interrupted, and he was employed in learning the woollen manufactory at Leeds. When Joseph Milner was appointed head master of the grammar-school at Hull, he released his brother from his engagements at Leeds, and took him under his own tuition, employing him as his assistant in teaching the younger boys. In his life of his brother the dean expresses his sense of this act of kindness with an affectionate warmth which shows the attachment that existed between the brothers, and is equally creditable to the feelings of both. In 1770 Isaac Milner entered Queen's College, Cambridge, where he took his degree of B.A. in 1774, and was Senior Wrangler. In 1775 he was elected Fellow of Queen's College, and in 1783 Jacksonian Professor of Experimental Philosophy; in 1788 he took his degree of D.D., and was elected Master of Queen's College; and in 1798 he was appointed Lucasian Professor of Mathematics. In 1791 he was appointed Dean of Carlisle. He was twice Vice-Chancellor, in 1792 and 1809. At Cambridge he formed a close friendship with the late Mr. Wilberforce, by whom he was introduced to Mr. Pitt; and in company with those eminent men he made a tour on the Continent about the year 1787. He died at the house of Mr. Wilberforce, at Kensington Gore, on the 1st of April, 1820.

Dean Milner was possessed of very extensive and accurate learning, which he always had at his command. He had great talents for conversation, and a dignified simplicity of manner. His religious and political principles agreed pretty closely with his brother's. He wrote the following works, besides several scientific papers in the 'Philosophical Transactions,' and the continuation of his brother's 'Church History:'—'Animadversions on Dr. Haweis's History of the Church of Christ;' 'Strictures on some of the Publications of the Rev. Herbert Marsh, intended as a Reply to some of his Objections against the Bible Society.' The following were published after his death:—'Sermons,' 2 vols.; 'Essay on Human Liberty.'

('Memoir of Dean Milner,' in the *Christian Observer* for May, 1820, vol. xix., p. 289.)

MILO', MELOS, one of the larger Cyclades in the Ægean sea, about 70 miles north of the coast of Crete, and 65 east of the coast of the Peloponnesus. It is 14 miles long from east to west, and its breadth is about eight miles. Its northern coast is indented by a deep bay, which forms a natural harbour, one of the best and safest in the Levant. The surface of the island is mountainous, and of volcanic formation; it has hot mineral springs, and mines of sulphur and alum. The soil is fertile, and produces abundance of fruit, wine, oil, and pasture for cattle. The population, which was above 20,000 in the time of Tournefort, about a century ago, has greatly decreased; it is now stated vaguely at 7000 by Balbi, and at only 1500 by Thiersch, but this last estimate appears too low.

Besides the chief town, called also Milo, which is in the east part of the island, near the port, there are several villages, called Pollone, San Dimitri, Castro, &c. The lower grounds near the sea are marshy, and are said to render the air unwholesome in summer.

Melos is said to have been colonised first by the Phœnicians, and afterwards by the Lacedæmonians. During the Peloponnesian war the Athenians sent an armament to reduce it under the command of Nicias, the son of Niceratus, but the attempt failed. Some years later in the war a new expedition from Athens landed on the island, and after a siege of several months took the town of Melos, when the Athenians put to death all the adult males, and carried away the women and children as slaves, after which a colony of Athenians was sent to occupy the place. (Thucyd., iii. 91; v. 84, &c.) At a later period Melos, like the other Greek islands, became subject to Rome, and afterwards to the Byzantine emperors, the Venetians, and the Turks. It now forms part of the new kingdom of Greece.

There are extensive remains of the antient capital of the island, Melos, near the great harbour, consisting of part of an amphitheatre, cyclopean walls, a temple of Venus, and numerous subterranean galleries. A fine statue of Venus, found at Melos, is in the museum of the Louvre at Paris.

A number of vases and other antiquities have been discovered among the ruins.

Near the north-east extremity of Milo is the rocky island of Cimolos, called by the Italian sailors Argentiera; the channel between the two is very dangerous in stormy weather, and noted for shipwrecks. (Dapper, *Description des Isles de l'Archipel.*; Porcacchi; Tournefort.

MILONOV, MICHAEL, a Russian poet of considerable talent, and who, but for his premature death, would probably have risen to greater literary eminence, was born in 1792, and received his education at the university of Moscow, where he distinguished himself by his application and abilities. His poems, which were first published in a collective form in 1819, consist chiefly of satires, epistles, and various lyrical pieces, and display elevation of mind, acute thinking, and tender feeling. Among them are some translations and imitations from Horace, Schiller, and others. He died October 17-29, 1821.

MILTIADES (Μιλτιάδης) was the younger son of Cimon (who was sprung from a noble Athenian family), and nephew of the elder Miltiades, who, during the life of Pisistratus, had founded a tyranny, or arbitrary government, in the Chersonese. The elder Miltiades had been succeeded by Stesagoras, the elder son of Cimon, on whose death the young Miltiades succeeded to his place. The first important affair in which Miltiades appears is at that juncture, during the Scythian expedition of Darius, B.C. 513, when the Greek commanders who guarded the raft over the Danube debated whether they should not cut off the Persian king's retreat by breaking up the passage. Miltiades advised the destruction of the bridge, and although his opinion was overruled, it is not too much to suppose that his reason for advocating it was exactly that on which it was afterwards rejected. So shrewd a politician could hardly have failed to observe, that to annihilate the Persian power was, as Histiæus suggested, tantamount to giving all the tyrants of individual cities their dismissal.

Twenty years afterwards, Miltiades was called upon to act a more important part. Hipparchus, one of the sons of Pisistratus, had fallen by the hands of Harmodius and Aristogiton; and Hippias, the other son, who had been driven from Athens chiefly by the aid of the Spartans, had retired, as Greeks both then and subsequently often did under similar circumstances, to the Persian court. In Ionia, the burning of Sardis was followed by a war which lasted for six years, in which each party seemed to have learned a lesson: the Persians, that their enemy was not altogether despicable; and the Greeks, that without unity of plan there was no hope of success.

In B.C. 492, Mardonius led the first Persian armament, which was dispersed by a storm in doubling the peninsula of Athos. In B.C. 490, a second armament under Datis and Artaphernes was sent against Greece. This force crossed to Naxos, and thence to Delos and Eubœa. A few days sufficed to sweep through the island of Eubœa, and the whole armament made for the coast of Attica. Guided by Hippias, who knew the capabilities of every spot of ground in his country, the army landed at Marathon. [MARATHON.] The plain of Marathon extends inwards from the sea to the mountains, where it is contracted into a narrow glen by the spurs of two hills, but spreads out beyond the base of these spurs and between them and the sea. It is roughly in the form of a T, the top stroke representing that part which borders on the sea, and the leg of the letter corresponding to the glen, which is divided lengthwise by a mountain stream. Through this glen lay the road to Athens, and on the eastern side of the hill the Athenian army posted itself.

According to custom, the army was under the direction of ten generals, each of whom took the command for one day in turn. One of the ten was Miltiades, who had just been acquitted on a charge of tyranny, more perhaps owing to the politic way in which he had used his power in the Chersonesus, than to the real merits of his conduct. He had a powerful ally in the polemarch Callimachus, who, by virtue of his office, commanded the right wing, and had an equal vote with the ten generals. The votes of the generals being divided on the question of an engagement, Callimachus, by his vote, decided for fighting; and when the day of command came round to Miltiades, the battle took place.

The Persian army was much more numerous than that of the Greeks, who are generally reckoned at 10,000. In the centre of the Persian host were stationed their best soldiers, a precaution necessary in order to give some stability to an army composed of forty or fifty different tribes, but injurious inasmuch as it exposed them to the very manœuvre which Miltiades practised, and with a view to which he apparently arranged his forces, so that the centre might be weak and the wings strong. The Persian centre broke that of the Greeks, and pursued them toward the hills, but in each wing the Athenians, who had charged at double-quick time, dispersed those who were opposed to them, wheeled round and routed the victorious Persians. This decided the battle. The vanquished perished in thousands, by the sword, in the marshes, and in attempting to embark on board their ships; and the Athenians and their allies the Platæans were left completely masters of the field. Herodotus states 6400 as the number of the Persian dead, and 192 the number of the Athenians who fell. The tactics practised at this battle are worthy of remark, as being so completely opposed to the Dorian plan of preserving a close and impenetrable phalanx, and much more nearly allied to those of modern warfare. Perhaps no battle ever reflected more lustre on the successful commander than that of Marathon on Miltiades; though it should be observed, that he, whom all ages have regarded as the defender of liberty, began his career as an arbitrary ruler, and on only one occasion in his whole life was engaged on the side of freedom; but for the same man to be the liberator of his own country and a despot in another is no inconsistency, as the course of human events has often shown.

The battle of Marathon put an end to the expedition headed by Datis and Artaphernes, and the career of Miltiades closed soon after. He appears next at Paros, to which he laid siege with seventy Athenian ships. The Parians defended themselves bravely, and, if we may believe Herodotus, Miltiades had recourse to magic, in the practice of which he received a wound, which, with general ill success, compelled a retreat. On his return, while yet suffering from a gangrene in the wound, he was accused, tried, and condemned for deceiving the people. The punishment was commuted for a fine; but being unable to pay it, he died in prison.

The character of Miltiades is one on which, with the few materials which history has left, we should not judge too exactly. The outline which remains is one that, if filled up, would seem fittest to contain the very model of a successful statesman in an age when the prime minister of Athens was likewise the leader of her armies. Heeren has briefly noticed the transition which took place in the character of Athenian statesmen from the warrior like Themistocles and Miltiades to the warlike rhetorician like Pericles, and thence to the orator, who to his rhetorical skill united no military prowess. Miltiades with great generalship showed great power as a statesman, and some, but not much, as an orator. This is agreeable to his age. Whether he was a true patriot, governed by high principle, it is now impossible to determine. He achieved one great action, which for his country produced a most decisive result. The unfortunate close of his career may be considered by some as showing the ingratitude of democracies; but perhaps a judicious historian will draw no conclusion of the kind, especially with such imperfect materials before him as we possess for the life of this illustrious Athenian.

(See Herodotus, lib. v., vi.; Cornelius Nepos, whose biography of Miltiades is of no value; Plutarch; Thirlwall's *History of Greece*; and Clinton's *Fasti*; for the office of Strategus, Schömann and Meier's *Attische Process*; and for the topography of Marathon, Pausanias, Dodwell, and E. D. Clarke's *Travels*)

MILTON. [KENT.]

MILTON, JOHN, son of John and Sarah Milton,* was born December 9, 1608, at his father's house in Bread-street, London. He was of a good family, his father having been educated at Christ Church, Oxford, but was disinherited for turning Protestant. He was a man of great musical acquirements, and specimens of his composition are preserved in Burney's 'History of Music.'

Milton's education appears to have been sedulously conducted; first under a person of Puritan opinions named Young, who was master of Jesus College, Cambridge, during the Protectorate, and afterwards at St. Paul's School under Alexander Gill. From St. Paul's he proceeded to Christ's College, Cambridge, where, as the College Register informs us, he was admitted, February 12, 1624.

At the University he was distinguished for the peculiar

* The name is spelt Mylton in the baptismal register.

excellence of his Latin verses, and, according to his own expression, met with 'more than ordinary favour and respect' during the seven years of his stay there. It will be unnecessary here to go into the momentous question whether Milton was whipped at Cambridge. Dr. Johnson is 'ashamed to relate what he fears is true, that Milton was one of the last students in either university that suffered the public indignity of corporal correction,' and Warton, in an elaborate commentary on Milton's first elegy, draws from the words a meaning which would have startled the author: but there appears small reason to believe the fact.

After having declined both the church and the bar, he retired to his father's house at Horton in Buckinghamshire, where, during a residence of five years, he read over all the Greek and Latin classics, and, as it is supposed, wrote his 'Arcades,' 'Comus,' 'L'Allegro,' 'Il Penseroso,' and 'Lycidas.' Attempts have been made to fix the precise place where some of Milton's minor poems were written, by a reference to the descriptions of scenery contained in them. It appears to us that these attempts depend on a mistaken principle; that, namely, of assuming the poet's mind to be influenced in such matters by the scenery with which he is at the time familiar. Now that localities must affect a person who is writing descriptive poetry, no one will deny; but in purely imaginative poetry, like 'L'Allegro' or 'Il Penseroso,' we cannot attach any great weight to such considerations, particularly when the descriptions are so general, and when the describer is Milton.

In 1637, on the death of his mother, Milton travelled into Italy, during which journey he was introduced to Grotius, to Galileo, and to Tasso's patron, Manso. While in Italy news reached him of the progress of the troubles in England. Relinquishing his original intention of prolonging his journey to Sicily and Greece, he returned, after an absence of fifteen months, and devoted himself to the education of his nephews, John and Edward Phillips, and to the politics of the day. Much has been said on his system: Dr. Johnson has sneered at it; and more modern authorities have caught at it in order to support a convenient theory, each perhaps without reflecting much on the subject. The tendency of his scheme was not to supply the then existing deficiency of instruction in the knowledge of nature, or to substitute some other treatise on such matters for the works of Aristotle, but to exchange, as quietly as possible, and at the same time as decidedly, the merely formal routine of classical teaching for one in which the books that were read might arouse thought as well as exercise memory. His list comprises almost all the technical treatises extant in Latin and Greek, but excludes history and almost all the better known books of poetry, probably because he only intended it for children, and postponed such subjects for the instruction or amusement of riper years. His aims were not those of a mathematician or the philosopher of nature; the state, not science, was in his view, and his object was to make, not good members of a university, but well-informed citizens. To this tend his eulogy of manly exercises and his plans for a common table, which could have had little importance in the eyes of a student.

In 1641 Milton began his political career by writing a treatise 'Of Reformation,' which was followed in the same year by those on 'Prelatical Episcopacy,' 'The Reason of Church Government urged against Prelacy,' and some animadversions on a tract of Bishop Hall's, and in the next by 'An Apology for Smectymnuus.'

In 1643 he married his first wife, who was the daughter of a country gentleman of Oxfordshire. Not long afterwards his conjugal troubles began, by the refusal of his wife to return to him from a visit to her father. He accordingly repudiated her, and in 1644 and 1645 published four treatises in justification of his conduct. The former year is also remarkable as that in which he produced his 'Tractate on Education,' and that most able of all appeals, the 'Areopagitica, or a Speech for the Liberty of Unlicensed Printing,' a work which contains in the same space more passages of surpassing eloquence than any other which proceeded from his own or from any other pen.

About this time Milton was reconciled to his wife, whose family had been reduced to distress by their devotion to the royal cause.* His pen was silent until after the execution of Charles, when he produced a tract on 'The Tenure of Kings and Magistrates; proving that it is lawfull to call to account a tyrant or wicked king,' &c. This was followed by 'Observations on the Articles of Peace, and Animadversions on the Scotch Presbytery at Belfast,' in the same year (1649). His next work, 'The History of England,' was interrupted by his appointment to the post of Latin secretary to the Council of State, which had determined that the Latin language should be used in all foreign negotiations, a custom which has not been dispensed with until lately as far as treaties are concerned. At present, treaties are written in French, in addition to the languages of the parties to it; and disputes on the text are settled by an appeal to the French version. The Council could not have chosen any man in England better qualified for the office by his sound scholarship and his ready command of the Latin language; but it is to be regretted that in his controversies with Salmasius he should have stooped to criticise style instead of weighing arguments. In his new capacity Milton was deputed to answer 'Eikon Basilike,' which he did in his 'Eikonoklastes;' and soon after to rebut Salmasius's vindication of monarchy, by his 'Defensio Populi Anglicani,' of which two books Hobbes declared himself unable to determine whose language was best or whose arguments worst.

After his appointment as Latin secretary he changed his abode to Westminster. Upon the death of his first wife he married a daughter of Captain Woodcock of Hackney, who died in childbed within a year of their marriage. In 1654, or perhaps before that time, he became totally blind, a misfortune which his enemies considered as a judgment from Heaven.*

The duties of his office, occasional pamphlets on politics, and his 'History of England,' which appeared in 1670, employed him till he began 'Paradise Lost.' At the Restoration he retired into obscurity; but he seems to have incurred no particular danger, although he was once in custody of the serjeant-at-arms. Some ascribe his safety to Sir W. Davenant.

Having obtained indemnity under an act passed in 1660, he married his third wife, Elizabeth Minshull; and in 1665, according to Elwood the Quaker (who acted in some measure as his secretary), he had completed 'Paradise Lost,' which was shown to Elwood in a finished state in that year, during a visit paid by Milton to some friends of Elwood's in Buckinghamshire. The poem was licensed and published in 1667. Five pounds were paid by Samuel Simmons, the bookseller, for the copy, with a promise of five pounds more when 1300 copies should have been sold, of the first, second, and third editions respectively. The 'Paradise Lost' first consisted of only ten books. The division into twelve was made in the second edition, published in 1674, three years before which time he had produced 'Paradise Regained' and 'Samson Agonistes.'

In 1673 he published a 'Summary of Logic;' in 1673 a treatise 'Of True Religion,' &c.; and in 1674 his Latin letters and exercises. His last work was a translation of the Polish declaration in favour of John III. He died on Sunday, November 8, 1674, and was buried in the chancel of St. Giles, Cripplegate.

For full information on Milton's life, his habits, appearance, &c., the reader is referred to the very copious Life by Todd, prefixed to his edition of Milton's Poetical Works.

Milton belonged to the Independents, a name in his time expressive both of religious and of political tenets. He seems to have been as bold in speech as in writing, and this boldness, so early as the date of his Italian journey, gave his friends some uneasiness for his safety. But Milton did not consider, as some have supposed, that in entering on controversy he was following the bent of his nature: he calls it expressly a 'manner of writing, wherein knowing myself inferior to myself, led by the genial power of nature to another task, I have the use, as I may account it, but of my left hand.' After the death of Charles he took a decided part against the Presbyterians, as is shown by his tract on the Tenure of Kings, and became the champion of republicanism against Salmasius. This was the period of his greatest celebrity. As Latin secretary he held an official residence for eight years, and divided the curiosity of foreigners with Cromwell himself. Yet, at the Restoration, he had no hardships to complain of, except the exorbitant fees charged by the serjeant-at-arms, and it is even said that he had the refusal of his original office.

* The passage in 'Paradise Lost,' where the scene is supposed to be described, is well known (b. x., v. 940).

* A curious account of his blindness is given in his own words, 'Latin Epistles,' No. xv.

It would be out of place here to do more than notice in a cursory manner Dr. Johnson's critique of Milton's poetry. To attempt by writing to impress the beauties of an imaginative work upon those acquainted with that work is a task more easy than useful; for those who do not appreciate poetic beauty without the guidance of another man's judgment will seldom form any opinions of their own worth possessing: and in like manner those who are not by their own taste directed to see the faultiness of a critique like that to which we have referred, will probably derive little benefit from being told that it has faults. But there is another class of readers to whom it may be well to direct a few observations; those, we mean, whose taste is accurate enough to enable them to trace faultiness as pervading the system, though they cannot discern its particular mistakes. In any criticism, on whatever subject, it is most important that the spirit in which the work subjected to criticism was written, should be kept in view by the critic. With this restriction and condition an imaginative work like 'Lycidas,' written in the style of a school of Greek poets, of which Theocritus is the model, would never be called 'easy, vulgar, and therefore disgusting;' and its rhymes and numbers would not have been stigmatised as uncertain and unpleasing by any one who reflected that Milton had Italian models in view when he wrote 'Lycidas' in verses of unequal length.

Let no one try to render a poem, even epic or dramatic, into an historical form. Charles Lamb has attempted it; a man perhaps more likely to succeed than any of his age; and his prose Shakspere would rather deter than provoke imitation. The absurdity of reducing a chapter of Hume's 'History of England' into a metrical shape, and then criticising it as a poem, is sufficiently manifest; but when we come to an imaginative work like 'Il Penseroso,' dissect it into elements, and make these elements purely narrative, persons are and have been deceived into supposing this dissection to be legitimate criticism.

'Paradise Lost,' perhaps the greatest continuous effort of human imagination, had originally the form of a drama, of which several plans remain. The epical form however at last asserted its superiority, although enough of the drama remains in the present poem to enable us to trace with some distinctness the shape which it probably assumed. In spite of all that has been said and written on 'Paradise Lost,' the truth of Dr. Johnson's observation must be to a considerable extent allowed, that it is 'one of the books which the reader admires and lays down, and forgets to take up again.'

Much of this inattention is no doubt owing to the character of this age. Learned poetry suits us not. We require either passionate and powerful description, like Byron's; imitations of antiquity so disguised that we are not all of us able to trace them, like Walter Scott's; or thoughtful poetry, either couched in sensuous imagery, like that of Shelley, or aspiring to be philosophical, like that of Wordsworth. But for allusions to classical authors, however beautiful, for an exhibition and exposition of the leading doctrines of Christianity, couched in language however sublime, and for a history of events so gigantic, we have no taste when conveyed in the form of a poem. In other words, 'Paradise Lost' is not and cannot be extensively popular; and even among its admirers we shall detect many who judge of it not as a poetical but as a theological production. Taken as a whole, a proper estimate cannot be formed of it by any one who has not learning enough to enable him at least to perceive the learning of the author; and the same may be said of the dramatic works of Milton, for the allusions to passages in the Greek tragedies which are contained in the first few pages of 'Samson Agonistes' are almost equal in number to the lines themselves.

Milton's poetry cannot be dismissed without a word or two on his versification. His matchless ear led him to choose blank verse—a measure till then almost unknown except in dramatic works—as the best metre for an epic poem. To the same quality is owing the harmony of his lyrical verses, in which, as in everything else, he seems to have been a century in advance of his own time. If we compare his liquid verses with the lilting jingle which characterises almost all the versifiers of the last century who attempted the octave stanza, the difference will be immediately discerned. It was not until Milton began to supersede the French school that English poets produced verses approaching his own in sweetness. Such are some of Coleridge's and Shelley's, not to mention Scott, who borrowed his measures from other sources.

Of all authors, antient and modern, respecting whom conflicting judgments have been pronounced, no one has had more to contend with, both from the unwise conduct of his friends and the malice of his enemies, than Milton. Living at a time when party spirit ran high, and identifying himself with one of the extremes, his character has been assailed by many enemies, and of his defenders not a few have made up by violence what they wanted in discretion. It is part of our national habits to regard every man who can be so regarded, not according to his eminence in art or science, so much as according to his station as a political partisan. This is no theory, but a positive fact, which fact has become more generally true during the last half century from the accident of that literature by which the opinions of a great portion of the reading public is guided —the periodical literature—having assumed a tone decidedly political. Thus Milton is often viewed, not as a poet, not as a writer of all writers most eloquent, but as a partisan. And yet, until we divest ourselves of this deep-engrafted habit, we shall never read Milton's prose works as they ought to be read; we shall never see in them the commentaries on his own poetry which they supply; never trace those models of eloquence which they contain; never reflect that in Milton's polemics we find the perfection of a reviewer's style, with all the acumen and not half the heaviness of Bentley, and with qualities more adapted to controversy than any which have been exhibited from his time until the beginning of the present century; that in his historical fragment exists a mythological narrative written not less poetically than Niebuhr's 'Lays' and 'Legends' of Roman History, although Niebuhr was the first who followed, however unconsciously, this great example; and that in his 'Speech for the Liberty of Unlicensed Printing' the sentiments are noble, and are more nobly expressed than in any English composition before the days of Burke. It is as rhetorical models that we must view Milton's prose works; his logic may fail, his facts and arguments may be insufficient, but his eloquence remains unrivalled.

A curious change took place even during Milton's lifetime in regard to public taste. The Shaksperian drama, that wonderful combination of active and reflective poetry, gave place to a bad imitation of an unnatural model, the French heroic play. Italian measures, those which Surrey, Shakspere, and Milton had all more or less practised, were supplanted by the ten-syllable rhyming couplet of Dryden, imitated also from the French. In fact the nation took their cue from the court in matters of taste, and the court was not less subservient to French influence in literature than in politics. Whenever a good history of the eighteenth century shall be written, the historian will do well to trace distinctly the way in which English literature has been gradually recovering from the taint which it contracted after Restoration, as affording a curious illustration of the manner in which opinions on taste and on politics go hand in hand. And no such history can be written without including a deliberate investigation of the influence which Milton has exercised, and the esteem in which he has been held, particularly among the nonconformists, a body of men whose power, because silently applied, has been often underrated or even overlooked.

The editions of Milton's poetical works are very numerous. His prose works have been much neglected, and we are not aware that a uniform edition including the tract on Christian Doctrine has yet appeared.

In the year 1823 a Latin manuscript, with the title 'De Doctrina Christiana, libri duo posthumi,' was discovered in the State-Paper Office, and, from internal and other evidence, was ascertained to be the work which Milton was known to have written on this subject, and which was supposed to be lost. It was edited by the present bishop of Winchester (Sumner), and a translation was also published. This work is characterised by the usual boldness and freedom of opinion which pervade all Milton's writings. As a theological work, it is perhaps almost unnecessary to remark that it would be considered of little value by any denomination of Christians.

(Todd's *Life of Milton*; Milton's *Works*.)

MILVUS. [FALCONIDÆ, vol. x., p. 187.]

MIME (from the Greek *mimus* (μῖμος), an imitator), a dramatic performance of irregular form among the Greeks, in which occurrences of real life were clothed in a poetical

dress. It usually consisted of a single scene, mostly comic, sometimes with such dialogue added as the excitement of the moment prompted. Mimes appear to have been common entertainments at feasts. Sometimes they were acted on the stage. Sophron of Syracuse (born about B.C. 420), who wrote in the vulgar dialect of the Doric Greek of Sicily, is considered the inventor of this species of composition. His mimes were in rhythmical prose, and were highly esteemed by Plato, who is said to have carried to Athens the taste for this species of composition. With the exception of a few fragments, and the names of some of his mimi, the works of Sophron are lost. The fragments of Sophron are collected in the 'Museum Criticum,' No. VII. We have specimens of a mime in the fifteenth idyll of Theocritus. Philestion of Nicæa, another writer of mimes, was contemporary with the latter years of Socrates. Suidas (Φιλιστίων) calls his mimes *biologic*, or 'pictures of life.'

Among the Romans, mimes seem to have been nothing but irregular harlequinades, probably the lineal ancestors of our 'Punch.' In the time of Augustus, Bathyllus and Pylades divided the taste of the Roman capital as actors of mimi. Among the mimographers of Rome we find Mattius, Laberius, and Publius the Syrian, the second of whom died B.C. 43, when the third was in the height of his popularity. Laberius acted as well as composed mimes. In the reigns of the earlier emperors we meet with other mimographers of celebrity, but none came up to the reputation of Laberius and Publius.

(Macrob., *Sat.*, ii. 7; Suetonius, *Cæs.*, c. 39; Ziegler, *De Mimis Romanorum*, Göttingen, 1789, quoted in 'Conversations Lexikon.')

MIMNERMUS OF COLOPHON, a Greek elegiac poet, contemporary with Solon. Müller, quoting a fragment of Mimnermus's elegy 'Nanno,' says that he was one of the colonists of Smyrna who came from Colophon, and whose ancestors at a still earlier period came from the Nelean Pylos. To the reduction of Smyrna to Halyattes, he ascribes the melancholy character of his poems. (*History of the Literature of Antient Greece*, p. 115.) From Horace and Propertius we gather that his poems had reference for the most part to those appetites which are, in poetical language, expressed by the name of love. His mind however was of a melancholy turn, which gave to his writings a pensive cast not traceable in the writings of others who belonged to the same school. In the few fragments which we have remaining of Mimnermus, he complains of the briefness of human enjoyment, the shortness of the season of youth, and of the many miseries to which man is subject. Mimnermus was the first who adapted the elegiac verse to those subjects which, from this adaptation, are now usually considered as proper to it; Callinus, its inventor, having used it as a vehicle for warlike strains. The fragments of Mimnermus have been several times edited, in the collections of Stephens, Brunck, Gaisford, and Boissonade, to which may be added Bach's separate edition, published at Leipzig in 1826. They have been translated by Ch. von Stolberg, Herder, A. W. Schlegel, and others.

(Ulrici's *Geschichte der Hellenischen Dichtkunst.*)

MIMO'SEÆ are a division of the Leguminous order of plants, whose flowers are regular, the stamens long, usually indefinite in number, and hypogynous, and the flowers valvate in æstivation. They are in many cases polygamous, and their leaves are always more or less compound. The principal genus of the division is the Acacia. [ACACIA.] Mimosa itself consists of a considerable number of species, many of which are remarkable for the irritability of their leaves, a curious property which has always rendered them objects of interest. [SENSITIVE PLANTS.] The species commonly cultivated for the exhibition of this phenomenon is the Mimosa pudica, a South American annual. Among the useful plants belonging to Mimoseæ, and not included in the genus Acacia, are the Ingas sapida, dulcis, bigloboss, and some others, whose pods contain a sweet nutritious fæcula, which renders them fit for food; and several kinds of Prosopis, the astringency of whose pods and bark renders them valuable for tanning purposes. In general, in the northern hemisphere Mimoseæ are confined to tropical countries, or to those which have a high summer heat; but in the southern hemisphere they extend beyond such limits, as in Van Diemen's Land, where Acacias, called Wattles, are the commonest wood.

MINANGKABOU. [SUMATRA.]

MINARET (from the Arabic *menarah*, a lantern), in Turkish and Eastern architecture, a very slender and lofty turret, having one or more projecting balconies around it, that divide it externally into two or more stories. They are used in Mohammedan countries for the purpose of calling the people to prayers, and therefore serve the purpose of belfries. They are however generally more numerous than such purpose actually demands, there being one at each angle of the building, and sometimes a greater number, and hence they become highly characteristic features, as well on account of their frequency as their tall column-like shape, which causes them to contrast so picturesquely with the domes that crown the edifice, and together with which they serve to produce a pleasing and varied architectural outline. The resemblance to the column form is frequently greatly increased by the uppermost gallery being corbelled and ornamented for a short distance downwards, so as to assume the shape and mass of a capital, above which the structure is usually made to terminate in a small polygonal alcove, with open arches on its sides, and crowned by an ogive or bulbous dome.

MINAS GERAES. [BRAZIL.]

MI'NCIO. [PO.]

MINDANA'O. [PHILIPPINE ISLANDS.]

MINDEN, one of the three governments into which the Prussian province of Westphalia is divided, is composed of the antient principalities of Minden, Paderborn, and Corvey, of the county of Ravensburg, the bailiwick of Reckenberg, and the lordships of Rheda and Rittberg. Its area is about 2000 square miles, and the population 397,870. It is subdivided into 10 circles: there were formerly 13 circles, but some have been incorporated with others. The soil is of unequal quality. There are some barren spots, but the greater part is fertile in corn: hemp and flax also are generally cultivated, and supply materials for the manufacture of linen and thread, which, as in the rest of Westphalia, are the chief branches of industry. The pasturage is good, and cattle abound. Iron, lead, and salt are the most important mineral productions. The Weser is the principal river, and the trade on its banks is very considerable. That part of this government which formed the principality was formerly a bishopric, which was secularised at the peace of Westphalia, and assigned to the electorate of Brandenburg.

MINDEN, the capital of the government of the same name, is situated in 52° 18′ N. lat. and 8° 53′ E. long., in a very pleasant spot on the left bank of the Weser, partly in a plain, and partly on the declivity of a mountain-chain, in which, at the distance of about two miles from the town, there is an opening through which the Weser flows, forming the celebrated Porta Westphalica. Minden is one of the oldest towns in Germany. The streets are narrow and irregular; the houses are in general built of stone or brick, but old-fashioned. The Domplatz (the Close) is however a handsome square, planted with trees. The little river Bastan flows through the town, and falls into the Weser. Over the latter river there is a very old stone bridge, 600 feet long and 25 feet broad. The French, in their retreat in 1813, blew up two of the arches. Since 1815 Minden has been again converted into a fortress, and is now one of the strongest places in Germany. It has six gates. Among the public buildings are four Protestant and three Roman Catholic churches, the largest and handsomest of which is the cathedral. Besides the gymnasium and a seminary for schoolmasters, there are several public schools, a Lutheran convent, an orphan-house, a bible society, and other useful institutions. The manufactures are of woollen, linen, leather, tobacco, &c. Of late years the refining of sugar has been carried on to a great extent. The vinegar manufactories and beer breweries and brandy distilleries are considerable. In the vicinity there are oil and saw mills. As the seat of the administration, the various public offices and tribunals of the government and the circle, and carrying on a considerable trade on the Weser, exporting hemp, corn, brandy, timber, yarn, &c., Minden is on the whole a thriving town, and the population (now 8000) is increasing.

The history of Minden presents some interesting particulars. In the year 1026 the emperor Conrad II. held a diet here, in order to have his son Henry III. elected king of the Romans. The Reformation having been introduced in 1529, the town was placed under the ban of the empire in 1538, and taken by the emperor Charles V. in 1547. In 1626 it was taken by Tilly, and in 1634 by George duke of Lüneburg. In 1651 thirty-one persons were beheaded in the town for witchcraft, and afterwards burnt.

on which occasion a debate took place in the provincial assembly on the question 'whence they should get wood to burn the witches?' In 1757 it was occupied by the French, in 1758 by the Hanoverians, and again by the French under Marshal Broglie in 1759. The movements of Prince Ferdinand having caused the French under Castries to take up a position to the west of the town, near the neighbouring village of Todtenhausen, they were attacked by Prince Ferdinand, who had only 40,000 British and Hanoverian troops, on the 1st of August, 1759, and defeated, with the loss of 8000 men, of whom 3000 were made prisoners.

MI'NDORO. [PHILIPPINE ISLANDS.]

MINE, a system of subterranean works or excavations formed in or going down upon any mineral or metalliferous deposit, for the purpose of exploring its contents, and extracting such portions of them as may be of sufficient value. These excavations are arranged in such a manner as to facilitate the drainage and ventilation of the works, to render them easily accessible to the miners, and to economise the application of labour in the extraction of the metallic ores or other mineral produce. In addition to the underground works which constitute the mine, properly so called, the term usually comprehends also the ground at the surface, together with the numerous appendages which are required there, as steam-engines, water-wheels, and other machinery for drainage, the extraction of the ores and their mechanical preparation, with various buildings and erections. The various works which constitute a mine, and their construction and arrangement, are fully described in the article MINING.

Mines are usually worked by companies, who hold grants or leases of the property from the mineral proprietors, for a certain term of years, commonly twenty-one. The risk and responsibility of the undertaking entirely devolve upon the former party, by whom the capital is provided and the management conducted, the proprietor of the mineral receiving a stipulated portion of the gross returns of the mine as a consideration for the use and deterioration of his property. This proportion varies much according to circumstances. In the north of England, where the mines are comparatively shallow and cheaply worked, it is commonly an eighth or a tenth; but in Cornwall, where the mines are deep and expensive, it seldom exceeds a fifteenth, an eighteenth, or a twenty-fourth, and is sometimes as low as a thirty-second. Although this payment, which is denominated 'dues' or 'royalty,' from the circumstance of all minerals having originally been the property of the king, is of course a matter of right, and claimed as such whether the mine is profitable to the parties working it or not, it is frequently good as well as liberal policy to greatly reduce or even remit it for a time, during periods of temporary poverty or loss, as a company may thus be encouraged to make further trials, which in the end may occasion discoveries highly beneficial to both parties. Considered as property, mines are exceedingly varied and fluctuating, some making very large profits, others barely paying their expenses, while upon many there is a heavy loss. Of the capital required to open mines in this country, no general average can be given: in some cases not more than 4,000*l.* or 5,000*l.* have been expended; in others, the sum has amounted to 150,000*l.* In the older and best established undertakings, the number of shares is small, as 64, 100, or 128. In some recent companies it has been subdivided into several thousands; but most of these have been unsuccessful. Of the profit of mines no general estimate can be given. In some cases it little more than repays the capital expended; in others it amounts to two or three hundred thousand pounds after paying back this sum, while of course every intermediate gradation exists. The duration of mines is very uncertain: some few are now working which are known to have been opened centuries ago, but these have been abandoned time after time in consequence of poverty or difficulties arising from imperfect machinery, and re-opened as improvements in the art of mining afforded a further scope for enterprise. It may probably be stated that mines of the soft metals, as copper, tin, and lead, rarely continue in a uniformly productive state for more than fifteen or twenty years together, although the discovery of fresh deposits of ore may prolong their existence greatly beyond this period. Coal and iron mines, on the contrary, are more permanent in their produce, and may continue to be worked for an indefinite term of years.

Great Britain is pre-eminently a mining country. With the exception of quicksilver and the precious metals, it contains every variety of mineral in great abundance, and has been estimated to produce annually a greater amount of mineral wealth than all the other countries of Europe together. Rich and extensive mines of copper and tin are worked in Cornwall and Devonshire; and in Wales and the north of England there are immensely productive lead-mines. There are rich mines of copper in Ireland, and lead-mines are worked both in that country and in Scotland. The most productive mines of coal and iron in the world are opened in South Wales, in Staffordshire, and in Scotland, while valuable coal-mines are worked in Lancashire, Cumberland, Yorkshire, Durham, Northumberland, and many parts of Scotland and Ireland. Beds of rock-salt are extensively worked in Cheshire, and large quantities of salt are obtained from brine-springs in Worcestershire. The depth which mines have attained in this country is very considerable, amounting in many cases to from 200 to 300 fathoms. The quantity of water drawn from them is far greater than in any other part of the world, and the machinery employed is of the most powerful and perfect description. The extent and produce of the English mines, the large capital employed in them, and the boldness, the skill, and ability with which their management is conducted, are the admiration of foreign engineers, who make frequent visits to this country to inspect them.

Mines are worked on a more or less extensive scale in every quarter of the globe, and almost in every country, but more especially in those in which igneous and metamorphic rocks are abundant. France and Belgium have numerous mines of coal and iron, and many in which copper, lead, zinc, and other metals are worked.

Spain is a rich mineral country, and even in its present distracted state the produce of its lead-mines, and more especially of its quicksilver-mines, is considerable. Germany has long been celebrated as a mining country, and there is scarcely a metal which is not now produced there. The mines of the Harz and of Saxony are well known from the skill with which they are wrought, and the quantity of silver which they produce, as well as copper, lead, and other metals. Austria has numerous mines, producing, together with other mineral substances, a large amount of gold, silver, and mercury. The mines of Russia are rich in iron and the precious metals, but sparingly productive of coal; those of Norway and Sweden produce copper and iron. Of the mineral produce of Asia and Africa little is known, but mines of coal are worked in India and in China. Tin is obtained in Banca, Borneo, and the Malayan peninsula, and gold-washings have long been carried on upon the coast of Africa. The continent of America, although abounding in metals and minerals, is most celebrated for its gold and silver mines; the former are chiefly situated in Brazil; the latter have been extensively worked in Peru and Mexico. The once celebrated quicksilver-mine of Guanca-Velica is situated in the former country, and rich copper-mines are now worked in Chili and Cuba. There are many mines of coal, iron, lead, and other minerals, now working in the United States of North America, and although hitherto little worked, mineral produce is probably abundant throughout many parts of British North America, in which the principal mines now existing are those of coal in Nova Scotia. The greatest depth to which any mine has ever penetrated is nearly 500 fathoms, or 3000 feet, and this only in one instance, in the Tyrol. The Samson mine in the Harz is about 2300 feet deep, and the celebrated Valenciana mine in Mexico attained the depth of 1800 feet, which is about the depth of the Consolidated Mines in Cornwall.

MINE'LLIUS, JOHN, was born about 1625, at Rotterdam, and died in 1683. He was rector of the public school in his native town, and edited many of the Latin classics, with short notes for the use of schools. He also published a translation of Terence in Dutch, Rotterdam, 1663.

MINERAL VEINS. [VEINS, MINERAL.]

MINERAL WATERS. [WATER.]

MINERALOGY, according to the definition given by Kirwan, is the art of distinguishing mineral substances from each other; and it is further observed by Mr. Brooke (*Encyclopædia Metrop.*, 'Mineralogy'), that it may be regarded both as a science and an art: as a science, in reference to the knowledge requisite for supplying accurate descriptions of minerals, and forming what may be termed a *natural* classification; and an art, in reference to the arrangement of the descriptive characters for the purpose of afterwards distinguishing minerals from each other.

Mineralogy then must be considered as including the chemical composition of bodies, and an account of their external or physical properties. Both are requisite, for substances occur which agree in their chemical composition, and exhibit differences in their external characters; while there are other bodies which differ in their chemical constitution, but agree in their external properties.

Various methods of arrangement of minerals have been proposed by different authors, which we shall not minutely describe or discuss, as the alphabetical arrangement which has been adopted in this work precluding any other here. We may however observe that, according to Werner, minerals were divided into the four classes of earthy minerals, saline minerals, inflammables, and metals: Karsten classed them under the heads of earths, salts, combustibles, and metals: Haüy divided minerals into acidiferous earthy substances, earthy substances, non-metallic combustible bodies, metallic bodies, substances not sufficiently known to admit of classification, rocks, and volcanic products. In Phillips's 'Elements of Mineralogy,' the classes are earthy minerals, alkaline-earthy minerals, acids, acidiferous earthy minerals, acidiferous alkaline minerals, native metals, metalliferous minerals, and combustible minerals. Berzelius has attempted a strictly chemical classification of minerals: he has however candidly admitted that considerable difficulties attend this method, owing, in part at least, to the uncertainty which exists as to what are the essential and what the accidental constituents of a mineral. The arrangement of Berzelius has however, with some slight modifications, been adopted by Mr. Brooke in the work to which we have already alluded.

We have already observed that mineralogy includes a knowledge of the chemical composition and of the external and physical properties of minerals, and they are all divisible into two great classes of crystallized and uncrystallized. With respect to regularly crystallized minerals we refer for an account of their forms to what is stated under CRYSTALLOGRAPHY. There are some substances which do not assume regular forms, but have an *imperfect crystalline structure;* while those bodies which are not either crystallized or crystalline, unless they are pulverulent, are described as *massive*, and these are subdivided into such as possess *particular forms*, as botryoidal, mammellated, nodular, stalactitic, reniform, globular, and *amorphous*, or *without any particular form.*

The *structure* of bodies is also an important character in some cases, and it may be compact, granular, fibrous, foliated, earthy, scaly, or laminar, and it is applicable both to crystallized and massive minerals.

Fracture is a very distinguishing characteristic in many cases; the principal are the conchoidal fracture, earthy, uneven, coarse, fine-grained, splintery, hackly, and irregular.

Hardness.—In this respect minerals differ greatly. [HARDNESS.]

Specific Gravity.—In this respect also minerals are very different from each other: for the modes of ascertaining it, see SPECIFIC GRAVITY.

Colour.—Minerals occur not only of every colour, but of every mixture of colours, and also colourless. Colour can scarcely be admitted as a very distinctive character, for there are some minerals which exhibit all colours: of this quartz is an example; for it is met with colourless, black, grey, brown, red, yellow, green, blue, purple, slightly bluish, pale grey, and slightly greyish.

Colour of Streak.—Sometimes resembles that of the mineral itself, but is often extremely different, so that it is impossible to foretel what it is likely to be. Hence the importance of the character. Sometimes the streak is merely shining, and its colour does not differ from that of the mineral.

Transparency, &c.—Minerals exhibit every degree of transparency, from the most perfect to absolute opacity. The different degrees are expressed by transparent, semi-transparent, translucent, translucent on the edges, opaque: it is also to be observed that some transparent bodies are doubly refractive, as calcareous spar, &c.

Lustre.—Minerals are described as having vitreous lustre (which is that possessed by the greater number of them), resinous lustre, metallic lustre, adamantine lustre, pearly lustre, resinoso-metallic lustre, vitreo-resinous lustre. When perfectly devoid of lustre, the mineral is described as dull.

Phosphorescence is the property which some minerals possess of becoming luminous when heated: this is particularly the case with apatite and fluor spar.

Electricity.—There are certain minerals which become electric either by friction or by heat: this is the case with the tourmaline, diamond, &c.

Magnetism.—There are certain oxides of iron, some of which are natural magnets or loadstones, and others which obey the magnet. No minerals but oxides of iron, or such as contain this metal or the oxide, possess either the power of attracting as a magnet, or of being attracted by the magnet.

Besides the above more general and distinctive characters, the elasticity and flexibility of minerals are sometimes described; thus mica is flexible and elastic, while talc is flexible but not elastic. The touch, smell, taste, and adhesion of minerals to the tongue, are in some (but comparatively few) cases mentioned by mineralogists.

Without submitting the mineral to a regular analysis, advantage is often taken of the effects of heat by means of the blowpipe, with or without the aid of certain fluxes, as soda, phosphoric salt, &c.; and the mineral is stated to be either fusible alone, or with the assistance of the different fluxes, and the nature of the resulting compound is described; sometimes it is a colourless glass, at other times coloured, transparent, or opaque, &c.

MINE'RVA, or MENE'RVA, an antient Italian divinity, known to the Greeks as Pallas Athene. [ATHENE.] Her attributes corresponded in most respects to those of the Grecian goddess. She was the patroness of arts and industry, such as spinning, weaving, &c., and was the goddess of all the mental powers. Her statue was usually placed in schools; and the pupils were accustomed every year to present their masters with a present called *Minerval.* (Varro, *De Re Rust.*, iii. 2; compare Tertull., *De Idol.*, c. 10.) Minerva also presided over olive grounds (Varro, *De Re Rust.*, i. 1); and goats were not sacrificed to her, according to Varro, because that animal was considered to do peculiar injury to the olive (*De Re Rust.*, i. 2).

There was an annual festival of Minerva celebrated in Rome in the month of March, which was called *Quinquatrus*, because it lasted five days. (Varro, *De Ling. Lat.*, v. 3; Ovid, *Fast.*, iii. 809; Gell., ii. 21.) On the first day sacrifices were offered to the goddess, and on the other four there were gladiatorial combats, &c. There was also another festival of Minerva celebrated in June, which was called *Quinquatrus Minores.* (Ovid, *Fast.*, vi. 651.) There were several temples in Rome sacred to Minerva. Ovid mentions one on the Cælian Hill, in which she was worshipped under the name of Minerva Capta, but the origin of the name is unknown. (*Fast.*, iii. 835-839.) It also appears from several inscriptions, in which she is called Minerva Medica, that this goddess was thought to preside over the healing art.

The etymology of the name of Minerva is doubtful. The first part probably contains the same root min, men, or man, that we have in the Latin me-min-i, men-s, &c., the Greek μέν-ος, μι-μνή-σκω, &c., and the Sanskrit man-as. Cicero (*De Nat. Deor.*, iii. 24) gives a very curious etymology, 'Minerva, quia minuit aut quia minatur;' but some of the antient grammarians appear to have been nearer the truth in considering it a shortened form of *Meminerva*, since she was the goddess of memory. Festus connects it with the verb *monere.* Müller (*Etr.*, ii., p. 48) supposes that the word is of Etrurian or Sabine origin.

MINES, MILITARY, are excavations made in the rampart of a fortress, or underground, in order to contain gunpowder, which, being exploded, the rampart may be breached, or any works of the enemy, above or near the mine, may be destroyed.

The term *offensive* is applied to the mines which are formed by the besiegers of a fortified place; those which are formed by the garrison are called *defensive mines*, or countermines. The cavity in which the powder is deposited is called the chamber; and the approach to the latter is called the gallery. [GALLERY.]

Two kinds of mines were antiently employed in the attack of fortresses. One of them was merely a subterranean passage carried under the walls from the exterior ground; and being suddenly opened within the town, the assailants were enabled to enter the latter by surprise. The other kind was executed in a similar manner, and was intended to lay the rampart of the place in ruins; for this purpose, the gallery, having been driven as far as the walls, was carried on to the right and left under the latter, which were supported by

props of timber till the time appointed for the assault was come; then, the props being drawn away or consumed by fire, a portion of the rampart fell into the ditch; and the troops, who were kept in readiness, passed over the ruins into the town. Mines of this kind are described in a relation of the siege of the castle of Boves near Amiens, at which siege Philip Augustus attended in person. At the siege of Melun, which was carried on by Henry V., king of England, and the duke of Burgundy, in the year 1420, the besiegers having driven their mine almost up to the walls, and the besieged having executed a mine in opposition, a barrier was erected where the two galleries met, and there the king and duke fought with lances against two Dauphinois.

As the parties engaged two abreast, it is evident that the galleries must have been much broader than such are made at present. The old French writers occasionally applied the term mines to what were also then, and are now, called trenches. Thus, at the siege of Harfleur, in 1449, mention is made of broad and deep trenches by which the approach to the wall is said to have been rendered secure; and the same works are immediately afterwards called mines.

Gunpowder was, n 1487, used in military mining by the Genoese at the siege of Serezanella, a town belonging to the Florentines; but on this occasion without success. It is stated however, in the life of Gonsalvo de Cordova, that Peter of Navarre, a Spanish engineer, formed mines with gunpowder at the siege of Cephalonia, near the end of the fifteenth century, when the Venetians and Spaniards took the island from the Turks. And in 1503 the same engineer, or, according to Vallière, an Italian called Francis George, succeeded in taking by such a mine the Castle del' Ovo at Naples. This fortress was situated on a rock nearly surrounded by the sea, and had during three years resisted the united arms of the Spaniards and Neapolitans. From that time the practice of forming mines with gunpowder has been almost constantly followed in the attack and defence of fortresses. By means of 1173 mines, great and small, the Venetians defended Candia during more than two years (1666 to 1669) against the whole power of the Turks: by mines also, in 1762, the town of Schweidnitz was defended during 63 days by the Austrians against the Prussians. In the course of this last siege two of the mines fired by the besiegers had charges of powder amounting to 5000 pounds each; and the depth of the charges below the surface of the ground was from 18 to 20 feet.

In the siege of any place the mining operations of the besiegers are directed to the discovery and destruction of the galleries of countermines; to the blowing up of any advanced works belonging to the garrison; to the demolition of the wall of the counterscarp, in order that the descent into the ditches may be facilitated; and occasionally, to the formation of breaches in the principal ramparts. On the other hand, the countermines are employed by the defenders to destroy the trenches and batteries of the besiegers beyond the foot of and upon the glacis; and also the lodgments which may be made on the breaches or within the works. It is easy to perceive therefore, that a system of countermines must add greatly to the strength of a place, by obliging the besieger to proceed with circumspection in his approaches aboveground, in order to avoid the risk of being blown up at every step; and, according to Bousmard ('Essai général de Fortification'), if the glacis of a fortress be countermined, the duration of the siege, which otherwise would have extended to one month only, may be prolonged to six weeks.

The chamber in which the powder is placed is a cubical excavation formed on one side of the gallery, very little larger than is necessary to enable it to receive the box which contains the powder; when this is deposited, the vertical face of the chamber is covered with boards, which are kept in their places by short timbers fixed in horizontal positions between them and the opposite side of the gallery. The latter is then filled up with earth, well rammed, to an extent in the length of the gallery greater than that of what is called the line of least resistance, that is, a line imagined to be drawn from the chamber perpendicularly to the surface of the ground above. The mass of earth thus filling the gallery is called the *tamping* of the mine. A train of powder in a cloth hose, forming a tube about three-quarters of an inch in diameter, and for security contained in a wooden trough called an *auget*, or a *casing-tube*, is laid from the box in the chamber through the tamping, to the place where the fire is to be applied; to its extremity is attached a piece of port-fire, as it is called, which, being lighted, the fire communicates by means of the train with the powder in the chamber, and an explosion takes place.

The dimensions of the crater or funnel formed by the explosion depend on the amount of the charge; its form may be considered as an irregular frustum of a cone, or paraboloid, and the mine is denominated *one-lined, two-lined*, &c., according as the diameter of the crater at the surface of the ground is equal to once, twice, &c. the length of the line of least resistance. Every explosion of this kind necessarily produces a compression of the earth in all directions about the chamber, to a certain extent; and the mines formed with high charges have been denominated *globes of compression* from this circumstance. A line drawn from the chamber to the circumference of the crater, on the ground, is considered as the radius of the globe of compression, or the distance from the chamber to which the lateral effect of the mine will extend. The last-mentioned kind of mine is used by the besiegers only, as it consumes more powder than the defenders can generally spare: its object is, by compressing the earth laterally to a considerable extent, to destroy a side wall of an enemy's gallery or blow down the counterscarp of a ditch.

The rules for determining the charges of mines are founded on the results of experiment, and it is evident that the charges must vary both with the nature of the soil and with the proposed figure of the mine, that is, with the ratio between the diameter of the crater and the length of the line of least resistance. When a mine of the kind called two-lined is formed in common earth, the amount of the charge in pounds is considered as very nearly equal to one-tenth of the cube of the line of least resistance in feet; but for a three-lined and a four-lined mine it is supposed that the cube of this line should be multiplied by ·21 and by ·45 respectively. In an experiment made at Potsdam, when a four-lined mine was formed in a sandy soil by the Prussian Major Le Febvre, the cube of the line of least resistance in feet was very nearly equal to the charge in pounds. According to the latest experiments of the French engineers, the charges of powder necessary to remove one cubic yard (English) of material are as follows:—

Common earth . .	1·21	pounds (English)
Strong sand . . .	1·64	"
Potters' clay . . .	1·75	"
Loose sand . . .	1·85	"
Old masonry . . .	1·94	"
Freestone . . .	2·14	,

Now the figure of the crater being supposed to be a paraboloid, of which the centre of the chamber is the focus—if a be the length of the line of least resistance in yards, and $n\,a$ represent the radius of the crater at the surface of the ground, also if $\pi = 3{\cdot}1416$, we shall have

$$a^3 \frac{n^2 \pi}{4} (1 + \sqrt{n^2 + 1})$$

for the volume of the crater in cubic yards: therefore, multiplying this volume by the numbers in the above table, we should have the charge in pounds.

In order to determine the proper size of the chamber, or rather of the box, which is to contain the powder, it will be necessary to observe that one pound of gunpowder occupies, in volume, about 30 cubic inches.

Experience has shown that the greater the charge of powder, the greater is the quantity of earth removed by the explosion. But this fact has its limits; for when the charge is considerable, since the whole of the powder does not take fire instantaneously, it will happen that the earth is partially displaced before the inflammation is complete; so that fissures being formed in the ground, the force of the powder is spent in the air without producing any effect. Hence it may be concluded that there is a certain charge of powder which will produce a maximum of effect; and it is supposed by Belidor that, in earth of mean tenacity, the greatest craters will have their diameters, at the surface of the ground, equal to about six times the length of the line of least resistance.

MINGRELIA. [GEORGIA.]

MINHO, River. [PORTUGAL.]

MINIATURE, a species of painting which, owing to its mode of execution being adapted only to very small subjects, and more particularly portraits, has acquired such a distinct

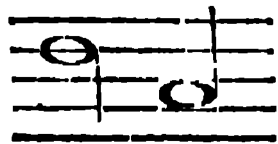
meaning in popular language, that, unless it be otherwise expressed, the term is used to signify a very small portrait, let it be executed in whatever mode it may,—as for instance, in enamel on the lid of a snuff-box, &c. The term is also applied adjectively as synonymous with minute. A very small portrait in oil is likewise so termed. But miniature painting itself is in water-colours, though it is not at all similar in its process to that employed in water-colour drawings in general. Instead of being applied in washes or by different tints laid over each other, the colours are entirely dotted, stippled, or hatched upon the surface; although sometimes only the face and other flesh parts are so executed, as those requiring greater finish and delicacy, while the drapery and background are either partially or wholly executed according to the usual or less laborious mode of water-colours. The material employed for painting upon is generally ivory (the surface of which is first prepared for receiving the colours), or vellum; sometimes Bristol-board, or other drawing-paper of that sort. Ivory however is preferred, as not only being more durable, but bearing out the colours with greater brilliancy.

As may be supposed from the nature of the process, miniature painting requires great nicety and patience, and is also exceedingly limited in its subjects, being scarcely fitted for anything beyond the face and bust of a figure. It it therefore very seldom used except for likenesses, for which, besides possessing the advantage of portability—and they may be so small as to be worn even in a finger-ring—it recommends itself by the extreme softness and delicacy of the colouring, and by its excluding all those harsher markings and lineaments of the countenance which must, even if softened down, be indicated in any picture of the size of life.

Formerly miniature, though of a somewhat different kind from that now in use, was employed for decorating or illuminating missals and other books, prior to the introduction of printing, when the books themselves were entirely the work of the hand, and consequently of such cost and value as to be considered worth such expensive adornment. Very lately that style of book decoration has been partly revived, by means of ornamental margins and borders of fanciful or arabesque patterns printed from wood-blocks.

MINIEH. [EGYPT.]

MINIM, in Music, a character, or note, formed of a round open head, and a stem descending or ascending from its right side—



When first introduced, the minim was the shortest note in music, as its name (from *minimus*, the least) indicates. It is half as long in duration as the semibreve, and double that of the crotchet. [CROTCHET.]

MINIMS, or MI'NIMI, an order of religious who improved on the humility of the Friars Minors, by calling themselves the Least, or smallest. They were instituted about the year 1440, by Saint Francis de Paulo, and confirmed in 1473 by Sixtus IV., and by Julius II. in 1507. In France they had the name of *Bons-hommes*; and in Spain that of the Fathers of Victory, in consequence of Ferdinand IV. gaining a victory over the Moors, according to a prediction of Saint Francis de Paulo. In Spain a convent of nuns of this order was founded as early as 1495, followed in the course of time by other similar establishments. In France there was no female convent of this order till 1621; when one was established at Abbeville, and another subsequently at Soissons. (Moreri, *Dict. Historique*; from Louis Doni d'Attichi, *Hist. Gen. de l'Ord. des Minimes.*) No house of this order was ever established in England.

MINING. The art of mining embraces the contrivance and management of the operations necessary to effect the various objects requisite in a mine, as the discovery of mineral deposits, the preliminary trials of their value, and the final extraction of their produce by means of suitable excavations and the application of the requisite machinery. These occupations may be said to constitute the business of the miner in the more comprehensive signification of the term, and it will be evident that they demand an extensive range of acquirements in which knowledge both practical and scientific must be blended.

History of Mining.—A regular or detailed history of mining, however interesting in itself, would far exceed the limits of this article; we shall therefore briefly glance over some of the most important steps by which mankind have been led to their present bold and extensive operations for the extraction of metals and other mineral substances. The use of the metals, and consequently some process for their extraction and separation, may be traced to the most remote antiquity, and is there lost in the obscurity which veils the early history of our species. Moses ascribes the first use and manufacture of the metals to Tubal-Cain, the seventh in descent from Adam, who is said to have been the 'instructor of every artificer in brass and iron.' Upon so brief a notice we are not entitled to build much, but it proves nevertheless that the use of the metals is almost coeval with the human race. Profane history likewise shows that it was known to the earliest nations of antiquity, as the Greeks and Egyptians. Gold and silver were abundant among the antients; an alloy of copper and tin formed the armour and weapons of the Greeks, although iron was not unknown among them, and of this metal the Roman weapons were formed. These facts do not however imply any great knowledge of mining, properly so called, as it is well known that metalliferous deposits are often found near the surface, frequently in a state of extreme purity, as gold and copper for example; and in early ages, when they had been so much less ransacked by the miner, these superficial deposits must have been much more abundant than at present, and probably furnished a large proportion of the metallic produce of those times. Most of the mines of antiquity were probably of a similar nature to the stream-works of Cornwall, and it appears from Strabo* (175, Casaub.) that the Phœnicians at that early time used to trade to Cornwall for tin and lead. In early times the demand for the metals could not have been very great; their use was then either as instruments of luxury or war, and thus confined to a limited class, so that the quantity found near the surface was in all probability fully adequate, leaving but little inducement for deeper and more laborious research.

There is however evidence enough to show that operations similar to those of modern mining were carried on by the nations of antiquity. Herodotus (vi. 46, 47) observes that a mountain in the island of Thasos was completely burrowed by the Phœnicians in their search for the precious metals; and the curious fragment of Agatharchides preserved in Diodorus (b. iii., ch. 12, 13) shows that the art of forming shafts and passages for exploring mines and procuring the metals was well known in Egypt. The silver-mines of Laurium in Attica were worked by the Athenians, to some extent at least, as early as the beginning of the fourth century B.C. Under the Romans the quicksilver-mines of Almaden in Spain [MERCURY] were extensively worked.

It is singular to observe that an art for which this country possesses such great natural facilities, and which was certainly cultivated here both before the Roman conquest and during the Roman occupation of this island, should afterwards have fallen into decay, and indeed for a time have been chiefly practised by foreigners. Prior to the Norman conquest our mines had been much neglected, probably in consequence of incessant civil commotion; and subsequently to this period they were chiefly worked by Jews. In the reign of Elizabeth the art of mining had fallen into so much decay that an importation of foreign skill was found necessary to revive them; and the Germans, long and justly celebrated as skilful miners, received every encouragement to settle in this country and turn their attention to them. From this measure some success appears to have resulted, and in the following reign we find Sir Hugh Middleton, a citizen of London, deeply concerned in the lead and silver mines of Cardiganshire, from which he derived a large revenue, which was expended in that noble work from which the metropolis still benefits—the formation of the New River. About this time a new and important auxiliary was furnished to the art of mining by the application of gunpowder for blasting, and an invention which had revolutionised the art of war thus became the means of effecting an equally extensive change in one of the most prominent arts of peace. Of the early use of gunpowder in mining, and more especially in this country, we have probably no very accurate account; the following particulars have been given by Mr. John Taylor in a history of mining in Rees's *Cyclopædia*:—' The application of gunpowder to

* Strabo speaks of the Cassiterides, which can be no other place than Cornwall or the Scilly Islands; probably the former.

the purposes of mining first took place in Hungary or Germany, about the year 1620, and it was first introduced into England at the copper-mine at Ecton in Staffordshire, about the year 1620, by some German miners brought over by prince Rupert. It was in use in Somersetshire about 1684, and it was not till after this period probably that the Cornish miners became acquainted with this powerful assistant to their operations. Its importance may be judged of by the amount of the present consumption in the mines of Cornwall alone, which has been calculated at an annual value of about forty thousand pounds sterling.'

In the early part of the eighteenth century another important event took place in the history of English mining. The rich deposits of copper which have long constituted the principal mineral wealth of Cornwall, had up to this time been neglected, partly perhaps from this ore being confounded with 'mundic,' or worthless iron pyrites, common in most mines, and partly from its lying deeper in the veins than the ores of tin, which had always formed the chief object of search. When at length the nature and value of the Cornish copper ore was fully recognised, a powerful stimulus was given to this new branch of mining, which has been carried on to the present time with great and increasing activity, the copper-mines of that county being now the deepest, the most extensive, and most productive in the world.

The great invention of the steam-engine, the progress of which during the last century exercised such vast influence upon our arts and manufactures, was early rendered applicable to mining in this country, and in a great degree contributed to the present perfect state of the art. Savery, who, if we except the somewhat equivocal claims of the marquis of Worcester to that honour, was the first person who constructed a practically useful engine worked by steam, sought in the first instance the patronage of persons interested in mines, as we see by his publication entitled the 'Miner's Friend,' in which he describes the nature of his invention and its applicability to draining mines. At this period our mines, although comparatively shallow, were much inconvenienced by water, especially those which were not in situations where hydraulic machines could be employed, and hence the application to them of this new power was at once obvious. The introduction of Savery's engine into our mining districts probably led to the great improvements effected by Newcomen, a resident in Devonshire, which vastly extended its utility, and indeed completely altered its principle. Their conjoined patent was taken out in 1705, and from that date the steam (or rather, atmospheric) engine became a most useful auxiliary in the hands of the miner, and was very generally employed for draining mines, not only in Cornwall, but in the coal-mines of Staffordshire and the north of England. The great improvements introduced by Watt in 1765 and succeeding years were quickly appreciated by the mining interest, and his engines were speedily introduced in the mining districts of Cornwall, where they effected a great saving of fuel, and therefore of expense, the coal used in that county being brought from South Wales. It is chiefly to the object of economy that the efforts of late engineers have been directed, and so successfully, that their improvements have fully kept pace with the increasing depth of our mines, many of the most productive of which would have long since been abandoned had not this been the case. These great improvements have chiefly originated in Cornwall, where ingenuity has been stimulated by the high price of coal; and among the numerous individuals who have contributed to them, the names of Woolf, Trevithick, and Grose may be particularly mentioned.

The improvements in the manufacture of iron which took place in the latter part of the last century, while they vastly increased the demand for it, and thus gave a great stimulus to the working of this metal, and of coal also for its reduction, contributed much to the perfection of mining generally, by enabling the miner to employ iron pumps instead of wooden ones, which were before used. This change allowed a better construction and arrangement of the pit-work, one of the most important apparatus employed in mining, and hence greater depths have been attainable than might otherwise have been the case. Among many minor improvements which may be traced to the same source may also be mentioned the laying down of iron tram-roads underground in mines, as well as their use upon the surface: the carriage of the mineral to different parts of the works has thus been greatly facilitated and economised.

Simultaneously with the improved machinery and apparatus introduced towards the close of the last century, great improvements also took place in the internal economy of mines and the arrangements of the underground works. The antient mode of following down the ore by irregular isolated excavations, and of stoping the bottoms of the mine in the German manner, gave place to the present system of laying open the ground for discovery and extraction, by a well-arranged series of shafts, levels, and winzes. By this plan the ore or mineral is divided into more convenient massses for extraction, and can be worked much more economically than by the former mode of stoping or cutting away the ground in the bottom of the levels, as still practised on the Continent.

The most recent improvements which have been introduced into mining are those which regard the mechanical treatment of the ores after they have been extracted from the mine, and previous to their being fit for the furnace. The processes used for this purpose are technically termed 'washing' and 'dressing,' by means of which the ore is freed from many of its earthy impurities, and thus rendered much richer for metal, in an equal bulk. In effecting this object, several kinds of apparatus are employed, chiefly the stamping-mill, the crushing-mill, and the jigging-machine, the use of which has been known from time immemorial; but more attention has latterly been paid to their application, and it has also become far more general, to the great benefit of all mines, especially those in which a large proportion of the poorer ores are obtained. The competition with foreign mines, in which labour can be obtained more cheaply than in this country, has done much to promote this class of improvements, which, though less striking than some others, have, within the last few years, been productive of extremely beneficial effects, and may still be considered as in progress.

The history of coal-mining is in great measure distinct from that branch of the art which we have been tracing, and which chiefly relates to the extraction of the metals. The introduction of gunpowder, the invention of the steam-engine, and the improved manufacture of iron, have formed however epochs of common importance to both, having greatly contributed to the present extended scale upon which our coal-mines are worked. The great objects to which improvement has within the present century been directed are the ventilation of the works and the invention of lamps which should not be liable to explosion on contact with the fire-damp. The system of ventilation in our collieries has been greatly improved of late years by Mr. Buddle and others; and the beautiful and well-known invention of the safety-lamp, in 1815, by Sir Humphry Davy, has afforded the miner a valuable though not in all cases an effectual preservative against explosion. Many attempts have been made of late to improve the safety-lamp, but none of the improved lamps have been generally adopted; and it is highly probable that in most cases of explosion, where Sir Humphry Davy's invention has been used, the accident has arisen rather from the carelessness of the men than from any defect in the contrivance itself.

One of the most important events in the history of mining in this country is only at the present moment beginning to develop itself, the establishment of suitable means of instruction for the mining engineer. This desideratum was first supplied by the university of Durham, which opened a class for instruction in civil and mining engineering, in January, 1838. In the latter part of the same year a similar department was opened in King's College, London; and a similar institution has just commenced its operations at Truro, in Cornwall, having been organised under the auspices of Sir Charles Lemon, who has at length supplied a deficiency which has long been acknowledged to exist in that great mining county. The local position of the Durham University and of the Truro Institution is highly favourable to the joint acquisition of theoretical and practical instruction; an advantage in which King's College cannot participate, although it may afford valuable preliminary instruction to the mining engineer. These institutions can hardly fail, in time, to produce an important effect on the mining industry of this country.

Mineral Deposits.—In proceeding to treat of the practice of mining, some preliminary details will be useful; for as mining operations are of course in great measure regulated by the nature of the mineral or metalliferous deposits to which they are directed, and by which are determined the form and construction of the mine, and much of its internal

economy, it will be necessary briefly to glance at this subject, and to point out some of the most important modes in which mineral masses are presented by nature to our research. Of the various classes into which mineral deposits may be divided, it will be sufficient for our present purpose to notice four only, *veins*, *beds*, *masses*, and *fragmentary deposits*, each of which is the repository of vast mineral treasures, but more especially the first two.

Veins have originally been, in most cases, long, narrow, and irregular fissures, traversing the rocky crust of the globe, which they penetrate to an unknown depth, and at a high angle of inclination. They are for the most part filled with sparry and stony substances, called the 'veinstone,' or the 'gangue' of the vein, but contain here and there irregular masses or 'bunches' of the metallic ores, often of immense size and value, and which it is the principal business of the miner to discover and extract. Most of the metals are of common occurrence in veins, as in this country, copper, tin, lead, and zinc, to which, in other parts of the world, may be added gold and silver.

Beds are layers of mineral substances interposed between the strata of solid rock, which, except in their containing valuable matter, they very much resemble. The layers of flint, which may be often seen imbedded in chalk wherever a section of this rock is made, will convey a good idea of a mineral-bed. Several of the metals, especially lead, are occasionally found in beds; coal, clay-ironstone, and rock-salt, exclusively so; but the last-mentioned mineral is far less regular and continuous than the former.

Masses, or 'pipe-veins,' as they are often termed by the miner, are not so easily defined: the best idea which can be given of them is that of an irregular branching cavity descending either vertically or obliquely into the rock, and filled up with metalliferous matter. Deposits of this nature are less common than the two former classes; they usually contain either copper or lead, and some of the rich oxides of iron appear to belong to a similar formation.

Fragmentary Deposits occur associated with and indeed forming part of many of the loose superficial beds of sand and gravel which occur in the valleys of mineral districts, consisting of the detritus of the neighbouring mountains, which has been washed down from thence at remote geological epochs. The mineral substances found in these deposits, which may be considered as having originally been derived from veins or beds in the vicinity, are not, in most cases, mixed up indiscriminately with the alluvial matter, their greater specific gravity having occasioned them to be deposited in distinct layers by themselves, usually towards the bottom of the mass. Tin and gold are the metals which most commonly occur in deposits of this kind.

Geological Position.—The above-mentioned mineral and metalliferous deposits are not found promiscuously distributed throughout all rocks or soils; on the contrary, there are certain rocks, or rather assemblages of rocks, to which they may be considered as in great measure peculiar. Granite, porphyry, and the older igneous rocks, generally are metalliferous, and often eminently so; but mineral deposits are on the whole most abundant in rocks of sedimentary origin, and more especially in and near situations where these two classes of rocks (the igneous and sedimentary) are in contact, or where a metamorphic structure has, from the action of internal causes, been superinduced upon the latter. It does not appear that nature has confined particular metals to any exclusive kind of rock, yet traces of a general association may still be perceived. Thus tin, copper, gold, silver, and certain deposits of iron, are most abundant in the class of rocks usually termed primary; while lead, zinc, mercury, and the earthy ores of iron, are most abundant in the older secondary rocks, which also contain our principal deposits of rock-salt. Veins are of most common occurrence in igneous and primary or metamorphic rocks, in the vicinity of which the derivative fragmentary deposits are therefore most often found, as is the case in the stream-works of Cornwall and the alluvial gold districts of Brazil. Mineral-beds, although sometimes occurring in primary rocks, are most common in secondary countries; and irregular masses, or pipe-veins, are most strikingly developed in limestone districts, where they probably occupy original cavities in the rock.

Metallic Ores and Mineralizing Substances.—The state in which the metals are found, the full consideration of which belongs to chemistry and mineralogy, will next require our attention, so far as it is immediately connected with the business of the miner. It must be well known that the metals are very rarely presented to us in a pure or metallic state, although native masses of copper and iron are occasionally met with; but gold, from its small affinity for oxygen and other mineralizing substances, although frequently alloyed, is never mineralized. The great bulk of the metals then, with the exception of gold, are found in the state of *ores*, that is, chemically combined with certain mineralizing substances, which completely disguise, and, in fact, till separated by metallurgical processes, destroy their usually recognised and useful properties. The most important of these mineralizing bodies are oxygen and sulphur; the next in rank are chlorine, and the sulphuric, carbonic, and phosphoric acids. The mode in which they combine with the metals is either in binary compounds, or in the union of two pairs of such compounds. Of the former we have examples in iron, lead, and mercury, which, when mineralized by sulphur, form respectively the following sulphurets, iron pyrites, galena, and cinnabar: we observe the latter in all cases where the metals are mineralized by acids, as in sparthose iron-ore, or carbonate of iron, in which one binary compound, the oxide of iron, is united to another, the carbonic acid. From this naturally compound state, in which the metals almost invariably occur, arises the art of metallurgy, which, although generally considered totally distinct from that of mining, is nevertheless most intimately connected with it.

Earthy Impurities.—Independently however of those chemical combinations from which the metals can only be freed by the smelter when treated in the furnace, there are other mechanical impurities scarcely less important, which require to be partially separated on the mine, and which therefore fall entirely within the province of the miner. Although large masses of the metallic ores, as before noticed, are concentrated in bunches or deposits, confined to particular portions of the vein, there is also a great proportion of the ore in all mines, which is more or less intermixed with the veinstone, or often indeed finely disseminated through it; and as the expense of fusing this large mass of earthy matter would greatly exceed the value of the metal which it contains, while on the other hand it forms too large a proportion of the produce of most mines to be thrown aside and rejected, great skill has been shown in all mining countries in contriving mechanical processes for effecting its separation as soon as extracted from the mine. When this separation has been properly accomplished, the metallic residue, before worthless, can be profitably smelted, to the great benefit of all, more especially the poorer class of mines, while those in which the precious metals are worked are entirely dependent for their existence upon the skill and care with which it is performed. The mechanical impurities here spoken of are often sufficiently obvious even in hand specimens of the metallic ores, which, unless purposely selected from the richest parts of the vein, will often exhibit thin alternate layers of the ore and veinstone, or sometimes irregular masses of ore of different sizes which are completely intermixed with and imbedded in sparry and stony matter, and this must be considered the character of a very large proportion of ores in their natural state. It frequently happens too that ores of a worthless character are mixed up with the more valuable ones; thus copper and lead are very generally accompanied by iron pyrites and blende, both of which must be regarded as impurities, and therefore separated as far as possible previous to any process in the furnace. The great bulk of the metallic ores, when in their natural situation, constitute in fact a most heterogeneous mixture, in which the really valuable metal exists only in a small proportion, chemically combined with one or more mineralizing substances, and completely intermixed with sparry and earthy matter and ores of inferior metals. A proper perception of this fact, which is scarcely noticed in works on mineralogy, is most essential to a right understanding of the art of mining, and of the various ingenious processes which in this and other countries have arisen out of it, having for their object the separation and concentration of the metallic matter drawn from the mine, previously to its being submitted to the action of fire.

Preliminary Mining Operations.—As the construction of a mine, or the arrangement of the underground works, must depend in great measure upon the nature of the mineral deposit to be wrought, if we refer to the great division of mineral deposits into veins and beds, before noticed, it is evident that this construction must be principally of two kinds, adapted to each of the above cases, independently

of the less definite processes adapted to the working of irregular mineral masses and fragmentary deposits. Thus in working a mineral vein, as in a copper or tin mine, the excavations will be formed either vertically or in a highly inclined position, and pursued laterally, or, as the miner terms it, 'upon the course of the vein,' while the advanced points tend progressively downwards, or 'in depth.' In working a mineral bed, on the contrary, taking a coal-mine for example, the principal excavations will be formed horizontally around the pit or shaft by which access is first obtained to the deposit.

As a very large portion of the metallic produce extracted by the miner from the earth, and more especially of the soft metals, copper, tin, and lead, is derived from veins, it is to the former of these arrangements that attention will be first directed. The working of coal and iron is considered hereafter, together with that of those minerals which are found in more irregular deposits. The general view of mining which falls within the limits of this article may conveniently be divided into the following considerations: the discovery of mineral veins or other deposits—the first opening of a mine and subsequent extension of the workings—the machinery and other appendages required by these operations, both underground and at the surface, with a brief notice of the surface works, and of mining economy and statistics.

Works of Discovery.—Mineral veins or beds are seldom visible at the surface of the ground, being generally concealed by the thick covering of diluvial matter which is spread over almost every portion of the globe, and hides from our view the solid rocky strata in which they are enclosed. In some cases however where this covering is partially wanting, they may be distinctly traced at the surface, and still more frequently they are rendered visible by the indentation of excavated valleys, and the channels worn by mountain torrents. The same effect is often produced by cliffs on the sea-shore, where veins occur in that situation, of which there are many examples on the coast of Cornwall.

As mineral deposits however present in most cases no trace of their existence at the surface, certain general indications must be had recourse to for their discovery. The most general of these indications (which can be but briefly noticed here) are furnished by geology, which teaches us that certain metals are most abundantly found in certain rocks, and further points out that they do not occupy any position indiscriminately in those rocks, but are almost exclusively found near their junction with other rocks of a different character, more especially near the contact of igneous masses with sedimentary strata, and that they commonly occur where rocks alternate together, and are broken and dislocated. Thus the tin and copper veins of Cornwall are situated chiefly in a species of clay-slate provincially termed 'killas,' and either near its junction with protruded masses of granite, or where it is intersected by channels of a porphyritic rock termed 'elvan.' In Wales and the north of England the lead veins are chiefly situated in the carboniferous limestone and rocks associated with it, especially in places where they are intersected and broken up by enormous faults and dislocations. Similar circumstances to these are very generally observed in all parts of the world, and it is also well ascertained that the local enrichment of veins is greatly influenced by their intersection with one another; and often indeed closely corresponds with the points of junction.

In addition to the general presumptions furnished by geological science, another and more precise indication of the existence of metalliferous deposits is afforded by finding pebbles or fragments of ore on or near the surface, generally either in the beds of streams or mixed up with superficial detritus. These scattered fragments, the result of diluvial action upon the outcrop of mineral veins or other deposits, may often be traced to particular spots, and thus the position of the deposits from which they originated may be established. In the north of England they are termed 'shoad stones,' and this mode of discovering veins is called 'shoading.' Should the exact situation of the vein whose existence has been ascertained in this or any other manner not be observable, it may be ascertained by opening trenches in the alluvial soil deep enough to expose the solid rock, their direction being at right angles to that in which analogy or the position of other veins in the neighbourhood would render it probable that the vein or veins in question might lie. This mode of finding veins is provincially termed in Cornwall 'costeening.' The object of discovery may be still more effectually attained, but at a greater expense, by excavating a nearly horizontal passage termed a 'level,' 'drift,' or 'adit,' from the bottom of the nearest valley, carrying it through the solid rock in the direction before mentioned, so as to intersect or 'cut' any mineral deposit which may exist in the ground through which it passes. This last plan is however seldom adopted, unless it is previously well ascertained that mineral veins do actually exist there, as it is too slow and too expensive to be undertaken upon uncertain grounds. Discoveries are sometimes made also by driving on the course of veins which occur in cliffs or are exposed in the sides of brooks: trials of this kind fall within the compass of working miners or persons of very small capital, and in some instances form the first step in opening mines which ultimately become of great importance.

Although the manner in which mineral deposits may be and sometimes are originally discovered has been thus detailed, it must not be supposed that the process is one of very frequent occurrence. The principal mineral districts in this and most other countries have been known and explored for ages, and by far the greater part of our mineral produce is extracted from deposits which have long been worked, the principal new discoveries being either made upon untried portions of known veins, or simply by excavating passages or 'cross-cuts' from mines now working, in a direction transverse to that of the vein upon which they are wrought, so as to prove the adjoining ground.

Financial arrangements, &c.—When however a new vein or mineral deposit has been by any process discovered, if the indications of metallic produce are such as to render it desirable to work it, the most usual step, after obtaining the consent of the proprietor, is the formation of a company for this purpose. For although mines are sometimes worked by individuals, experience has shown that a company is best adapted for carrying on mining operations, the amount of capital required being large and uncertain, and the risk great, while a long period may elapse before adequate returns are made. Hence, not only in England, but in most other countries, the system of working mines by companies has been adopted, being found decidedly advantageous. Certain stipulations are then entered into between the company and the proprietor of the land in which the vein or deposit is situated, or, should the mineral right not belong to him, with the person who does possess it. The principal terms of this agreement are to determine the extent of ground within which operations may be carried on, and to stipulate the proportion of the gross mineral produce or its equivalent in money which the owner is to receive free of all expense in raising and making it marketable. It often includes also compensation for damage done to the surface, and other considerations of less importance which are determined by the custom of the neighbourhood and other circumstances.

Before commencing operations, it is necessary to ascertain with some correctness (if it should not be previously known) the bearing or direction of the vein, and also its dip or 'underlie,' which may be done by sinking a few shallow pits upon it. These circumstances being known, there are two methods by which the vein may be explored, either by sinking upon its course from the surface, or by forming a horizontal passage to intersect it, commenced from some neighbouring valley or the lowest point on the surface which may be conveniently situated for the purpose; or both these modes may be carried on together if desirable. As however the practicability of forming a level or adit to prove the vein at a sufficient depth and within moderate limits as to time and expense must entirely depend on local circumstances, the former method, as being most expeditious, is generally resorted to, and is effected in the following manner.

Early Progress of the Works.—A spot determined either by convenience or by some promising indication is selected as the site of a shaft, which is frequently sunk in an inclined direction upon the course of the vein, or if intended to be perpendicular, it is commenced upon that side towards which the vein inclines or underlies, and at such a distance from its 'back' or outcrop, as to come down upon it a given depth, say 10, 20, or 30 fathoms. This depth is regulated by the means of the parties to prosecute the trial, and the depth at which analogy may lead them to suppose that ore in any quantity may be found, the superficial parts of veins being usually quite unproductive.

On cutting the vein, the shaft is for a time suspended,

and two horizontal passages, often termed 'galleries,' but by the miner 'levels,' are excavated or 'driven' upon the vein in both directions. These passages are usually about six feet in height and three or four in breadth, and rather smaller above than below. They are the principal means of exploring the contents of veins, and are made larger or smaller according to their richness or poverty, their width, and the nature of the enclosing rock. Should the shaft be intended to cut the vein at any considerable depth, it may be desirable to explore it above the point of intersection, and this is done by driving a short transverse level or 'cross-cut' to it, and driving two levels from the place where the 'cross-cut' meets it, as before described. Should the depth of the shaft before reaching the vein be very considerable, two or three of these cross-cuts will be driven first, and levels extended from them. The perpendicular distance of the levels from each other is regulated both by custom and local circumstances, but is usually about ten fathoms, that interval having been found most convenient for the objects of the miner.

After cutting the vein, there are two modes of proceeding —continuing the shaft perpendicularly through the vein, or obliquely upon the vein. Which of these two plans is followed will depend in great measure upon its produce and promise, as already ascertained by the upper levels, and partly also on the means of the miner, the former plan being most expensive and requiring the longest time, although ultimately most advantageous, while the latter, though a cheaper and quicker mode of exploring the vein, since it renders cross-cuts unnecessary, and is itself continually proving one portion of it, is not well adapted for the application of pumps and machinery, an evil which may not at first be very sensibly felt, but which increases proportionally with the depth of the mine, and the quantity of water and stuff which require to be drawn from it.

Supposing the shaft to proceed perpendicularly after cutting the vein, on reaching the depth of ten fathoms or thereabouts below the point of intersection another cross-cut will be driven to it; but as the shaft is now on the opposite side of the vein, this cross-cut will have an opposite direction to the former ones; and as they had successively become shorter as the shaft approached the vein, they will now successively become longer as the shaft proceeding perpendicularly downwards recedes further and further from the vein. In this manner the shaft proceeds indefinitely, cross-cuts being driven at every ten fathoms or whatever distance is most convenient, and levels extended from each upon the course of the vein, the nature and value of which are thus thoroughly explored. The continuance of these and other operations necessarily supposes that ore in some quantity has been found in the upper levels, which will have been all this time in progress, or at any rate that the indications of future produce are sufficiently strong to encourage the miner to proceed with his undertaking, the magnitude and expense of which will now be daily increasing, while various difficulties will be encountered in the progress of his works, more especially the want of ventilation in those parts which are most distant from the shaft, by which alone they can be supplied with air. It is chiefly in the ends of the levels that the evil of imperfect ventilation begins to be felt, the air here gradually becoming close and unfit for respiration, as they advance further from the shaft, especially when from the hardness of the ground frequent blasting is necessary. As soon as this is found to be the case, a remedy of a very simple nature is applied, which consists in sinking a small pit, termed a 'winze,' *upon* the vein of course, from the upper level to the extremity of the one below it. This communication having been effected, the two levels become perfectly ventilated, each having a double communication with the atmosphere by which both an ascending and descending current is produced. By this plan it is evident that the levels may be extended for a considerable distance upon each side of the shaft, winzes being continually formed between them at convenient intervals. Besides the purpose of ventilation, these winzes answer another use, since they make trial of the vein in the intermediate space between two levels, and also divide it into solid rectangular masses, which may be examined all round, and thus the miner has the means of judging with tolerable certainty of the nature and value of the ores contained in each, and can extract the produce in the most expeditious and economical manner. That such is the case will at once be evident when it is considered that these portions of the vein are perfectly drained and ventilated, that they may be attacked at once from as many points as may be convenient or may contain ore of sufficient value, and from this circumstance no necessity exists for breaking down the unproductive masses which are often found to intervene even where the vein is richest and the ore most continuous. When the vein has been properly laid open, the ore may be worked away round such unproductive pieces of ground, which, being left standing, will answer the purpose of supports to the rock on each side of the vein; and where the excavations are extensive, such support is extremely necessary, and often requires the use of strong timbering.

The utility of winzes for working out the ore is indeed so great, that it is only when little or no ore has been found in a level that it will have proceeded far enough for ventilation to become very defective, before a communication of this kind has been made. When, on the contrary, the ore is found to be tolerably continuous in driving a level, winzes are generally sunk at intervals of 20 or 30 fathoms, their position being so regulated as to prove the richest and most promising parts of the vein, and to avoid hard and unproductive portions which do not appear worth exploring. We will suppose however that a continuous body of ore is met with in one of the upper levels, and that winzes have been regularly carried down to the level below it. Similar operations will then be required here, and winzes will be sunk from it to the next deeper one in the same manner, but they will generally be situated about mid-way between the former, so that each may explore the ground under the middle of the rectangle formed by the two upper winzes and the levels between which they are placed, so as effectually to explore the vein with the smallest number of excavations. The system of works by which a vein is thus laid open, although by no means so regular, is not unlike the seams formed by courses of masonry, the horizontal joints of which may be supposed to represent the levels, and the vertical ones the winzes. In cases where the ore extends above the upper level in the mine, this part of the vein may be laid open by perpendicular excavations similar to winzes, but formed in the reverse manner, or by 'rising' upwards instead of 'sinking' downwards, as in the former cases, the height to which these 'rises' are carried depending on the extent of the ore in that direction.

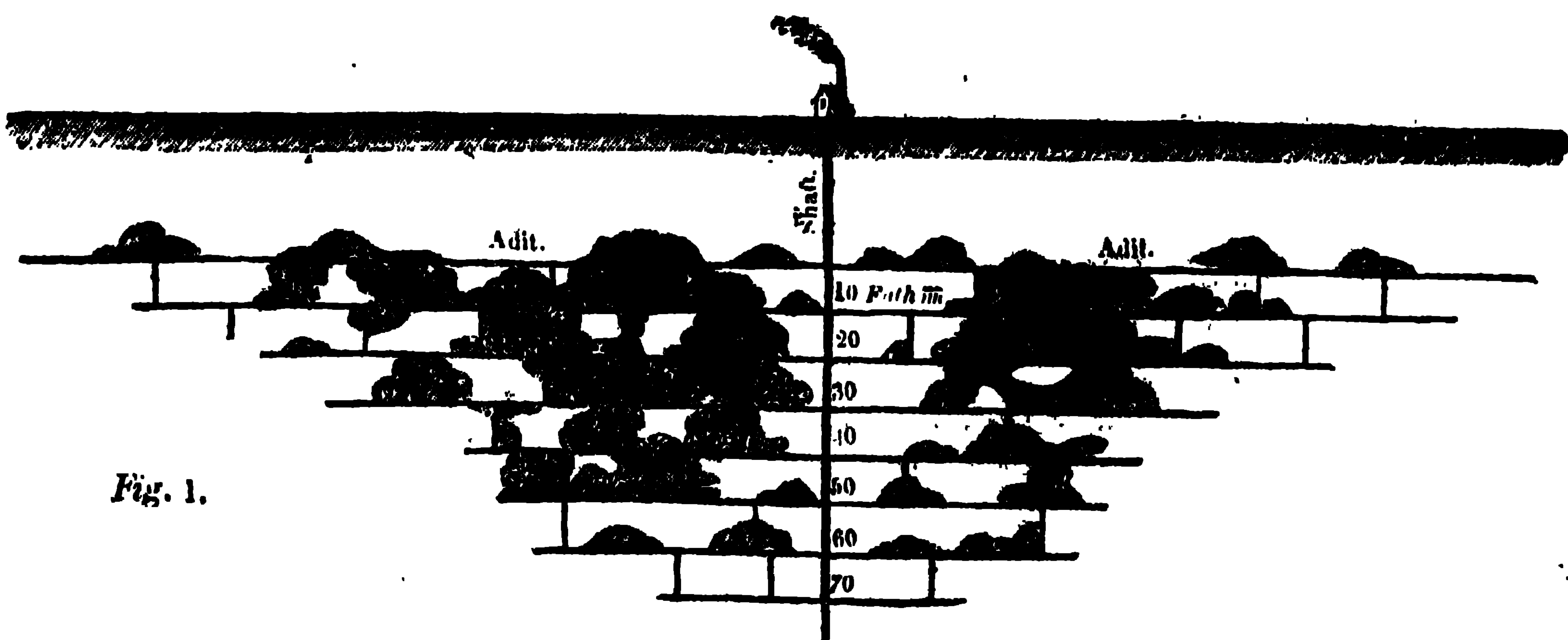
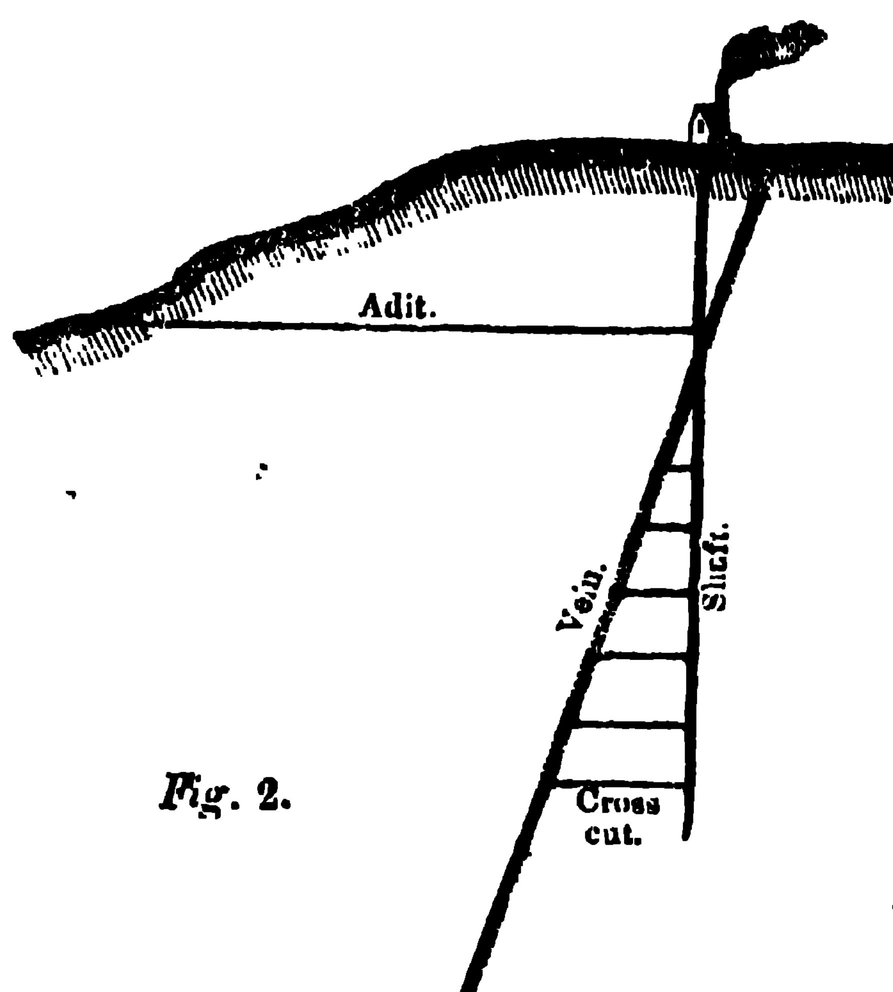


Fig. 1.

Longitudinal Section, showing the manner in which the vein is laid open by the levels and winzes.

Should the vein be found to contain ore of good quality and in sufficient quantity, both laterally and in depth, the various operations which have now been described may proceed indefinitely. The shaft will continue to be sunk, cross-cuts driven to the vein at every ten fathoms or thereabouts, levels extended in both directions from them (the upper level being always of course considerably more advanced than the lower, from having been longer in progress), and the ground between them subdivided by winzes as before described. The excavations will now have assumed a regular form, and become what is properly termed a mine, the objects for which they were undertaken having been accomplished, or the contents of the vein thoroughly explored, and its produce, where of sufficient value, rendered capable of being economically and expeditiously extracted. In the accompanying sketch, *fig.* 1, this state of the works is shown, the shaded portion representing the parts of the mine whence the ore has been extracted as described below. *Fig.* 2 gives a cross section of the mine, and with the former will completely illustrate the foregoing description.



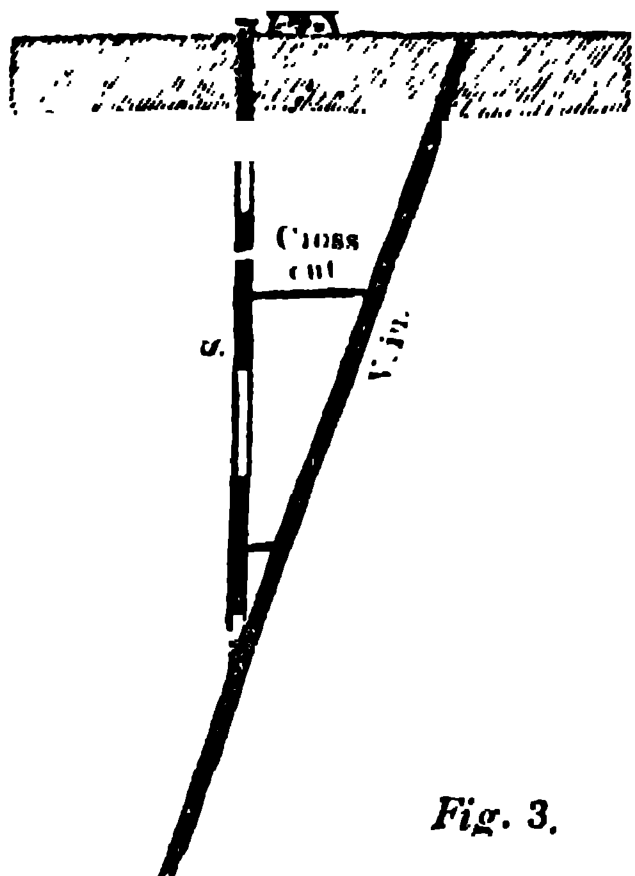
Cross Section, showing the progress of a shaft after cutting the vein.

Raising of Ore.—The operation last named, or the extraction of the ore, will not however have waited the advanced state of the works which we are now contemplating: a certain quantity will have been produced by driving the upper levels and sinking winzes below them, although not forming the primary object of these works; and wherever orey ground was seen in the 'back' or upper part of the level first driven, it will early have been pursued upwards towards the surface, and will yield the first returns of the mine. When by the further progress of the works the vein has been divided into the solid rectangular masses before described, the mine will have been brought into an effective state of working, and parties of men will be set to raise ores from all the most productive points. Where the vein is not very hard, the ore may be broken down with the 'pick' only, but it is generally necessary to blast it with powder, by which process large quantities are detached from the vein by every shot. In raising ores the men generally work upwards from the 'back' or upper part of one level towards the 'bottom' of another, and the excavations are so arranged that the ore may readily fall down to the level below them, whence it is carried in tram-waggons to the shaft, and thence raised to the surface. As in all large and well-regulated mines it is desirable to keep the quantity of ore raised as nearly as possible to a uniform standard, the process of 'opening ground,' as above described, will generally either keep pace with or even exceed the rate of exhaustion, so that a portion of the ore thus laid open may always be held as a reserve to keep up the returns of the mine during periods of temporary depression, when only poor and unproductive ground may be presented by the works of discovery. This judicious mode of proceeding is justly regarded as one of the greatest modern improvements in the economy of mining: it provides a compensation for those great irregularities and fluctuations to which all mineral deposits are continually subject; it keeps up the returns of the mine during temporary intervals of poverty, and enables those trials to be effected which may again place it in a productive state.

Extension of the Works.—As the workings of a mine become more extended, they gradually lose the simplicity which we have been supposing, and, from the multiplication of shafts and other excavations, become highly complex, a result to which the irregularity of mineral deposits greatly contributes. The nature of these ulterior operations will now be briefly described, still considering the mine as a mere system of excavations, and reserving till hereafter the subject of drainage, support, &c. When the levels have been extended to a considerable distance from the shaft, the ventilation will again become defective, notwithstanding their communication by winzes; the current of air, from the greater distance it is carried, becomes more and more feeble; and this evil is still further augmented by the increasing number of men now employed in the works, the number of candles, and the frequent process of blasting. The expense of the transport of ore and masses of rock and rubbish to the shaft also becomes considerable; and if the prospects of the mine continue such as to warrant the expense, a new shaft must now be sunk on one or both sides of the former. Whether one or two shafts will be necessary will depend on the direction in which the ore is found to extend, and the indications exhibited by the vein; and they will be so placed as to command that portion of it which, for reasons before stated, is without the reach of the former one, which by this time also may have become inadequate for the various purposes of extraction, drainage, and descent, to which it is applied.

In order to avoid the expense and delay of unnecessary cross-cuts, the new shaft will be so placed as to intersect the vein much deeper than the former, and this point will be so arranged as to correspond either with one of the deepest levels, or some proposed level deeper still. The new shaft may have been commenced in anticipation, while the levels were yet distant from the point where it is sunk; and in this case its communication with the mine will have been accelerated by driving levels to meet those which are proceeding from thence towards it. When this communication has been effected, its benefits will be immediately felt, both in the thorough ventilation of the mine and the increased facilities afforded for the extraction of ore and stuff.

As the process of sinking a shaft is often extremely slow, from the hardness of the ground (one fathom per week being a very good average, and sometimes half that progress being scarcely attainable), and as the most productive workings of a mine may be greatly impeded for want of another outlet to the surface, expedition is often of the utmost importance to remedy this evil, and it thus becomes highly desirable to accelerate the operation. The perfection which subterranean surveying has of late years attained enables the miner to accomplish this object by a very interesting process, whenever the workings of the mine have advanced near the spot where a shaft is required. The site of the shaft having been fixed upon and marked out at the surface, the miner, by a series of very accurate measurements of the length, windings, and direction of the levels, is enabled to ascertain correctly their relative position with regard to this spot, and consequently at what point each of them approaches nearest to a supposed vertical line penetrating the rock below it. This being ascertained, it is evident that by pursuing the same process still further, he may determine in what direction and to what distance cross-cuts must be driven from each of these points, in order to bring him exactly to this line, or underneath the site of the shaft; and having arrived there, that excavations exactly corresponding with it, both in form and dimensions, may proceed simultaneously both upwards and downwards from each cross-cut, while the shaft itself is being sunk from the surface, the work thus proceeding from several different points at the same time, as shown in *fig.* 3. It is found in practice that the various separate portions may be made to unite with surprising exactness; so much so, that even in very deep shafts, when complete, daylight may be seen from the bottom; and from the great saving of time which the process effects, it is now frequently used in mines of great depth, the working of which is much facilitated by it, as the work of many years may thus be brought within the compass of one or two. The most remarkable instance on record of a deep shaft being thus sunk from several points at once occurred at the Consolidated Mines in Cornwall, about nine years ago, where a perpendicular shaft, 204 fathoms in depth, was completed in less than a twelvemonth, being worked from fifteen different points at once.



Cross Section, showing the progress of a shaft worked at several points.

As the working of a mine proceeds, the increase of shafts and levels tends to obliterate, in a great degree, the uniformity and simplicity of operations which were at first apparent, the position of these works being entirely regulated by the irregular distribution of the productive parts of the vein, as developed in their progress. When the depth becomes considerable, many of the first shafts are rendered in great measure useless, either from being inclined, and thus inconvenient for machinery, or from having passed through the vein at a shallow depth, and thus requiring long cross-cuts previous to commencing the deeper levels. Hence, in very deep mines, a double line of shafts will often be found to range along the course of the principal veins; and sometimes even three shafts will be found opposite each other, and intersecting the same part of the vein successively at greater depths. In this case, while the most recent shafts are used for drainage and extraction, the older and more shallow ones are often fitted up as 'foot-ways,' and serve for the partial ascent and descent of the miners. In some of the large mines of Cornwall it is usual to sink two shafts within a few fathoms of each other, one being of large dimensions, and intended for a drainage or 'engine-shaft,' the other smaller, and adapted to drawing stuff only. This arrangement is found more convenient than having a single large shaft arranged for both purposes, for which however one shaft is often made to answer, being divided down the middle by timbering, and one side appropriated to the pumps and ladders, while the other is occupied by the 'kibbles' or iron buckets used for drawing the ore and in many cases the rubbish, when the latter cannot be conveniently disposed of underground.

Shafts in this country are generally sunk of a rectangular form, except in our coal mines, where a circular form is often preferred. Those intended for the extraction of ores, or 'whim-shafts,' are commonly six feet by four; those employed for drainage, or 'engine-shafts,' as they are generally termed, vary from about six feet by eight to eight by ten, or sometimes are rather larger. In coal-mines the pits are generally about seven or eight feet in diameter, the dimensions varying according to the nature of the ground and the arrangements proposed in them.

As veins are generally found to run nearly parallel, and often at no great distance from each other, and as the neighbourhood of a productive vein is a favourable indication of the contents of others in its vicinity, transverse levels or 'cross-cuts' are frequently driven from mines at various depths, with a view to discovering side-veins, or making trial of branches which diverge from the main lode. Should a productive vein be found in the neighbourhood of the first, the most usual mode of working it is by extending levels upon it, at the same depth as those in the mine from which the cross-cuts are driven, commencing at the points where these intersect it. In this case the same shafts will probably serve for both the old mine and the new one, the one being, in fact, a mere appendage, as it were, to the other. Should the distance of the newly-discovered vein be considerable, it will prevent the workings from being carried on in this manner, both from the length of the cross-cuts and from the difficulty of ventilation and extraction; and it will therefore be necessary to sink shafts upon it, and lay it open as a separate mine, in a somewhat similar manner to that which has already been described.

Metalliferous veins are often traversed by other veins crossing them nearly at right angles, which seldom contain ore, excepting perhaps near the points of intersection: they are termed 'cross-courses,' or 'cross-veins,' and occur in most mines. Cross-cuts are sometimes carried upon these veins, partly to explore their contents, and partly because the work will often proceed more rapidly than when in the solid rock; but this is not considered so effectual a mode of exploring the ground and discovering new veins as by driving in the rock itself.

The intersections of veins are very generally accompanied by a shifting and derangement of the metalliferous vein, the two portions of which, on the opposite sides of the cross-vein, are often separated to a very considerable distance. As veins are most productive at or near the points where such intersections occur, the metalliferous mass on which the miner had previously been working is completely lost on coming to a cross-vein; and it is frequently a work of considerable difficulty to recover it again, as the productive vein may be thrown or 'heaved' completely out of its former course. The first object to be ascertained, in the search for the dislocated vein, is in which direction the 'heave' has taken place, whether to the right hand or the left; and from analogy the miner is generally, though not always, enabled to form a correct judgment on this head. He then continues the level upon the cross-vein in this direction, till the metalliferous vein is again met with on the opposite side, when the level is continued upon it as before. If the search should be continued for a long distance without success, he will drive in the other direction, in expectation of meeting with it there.

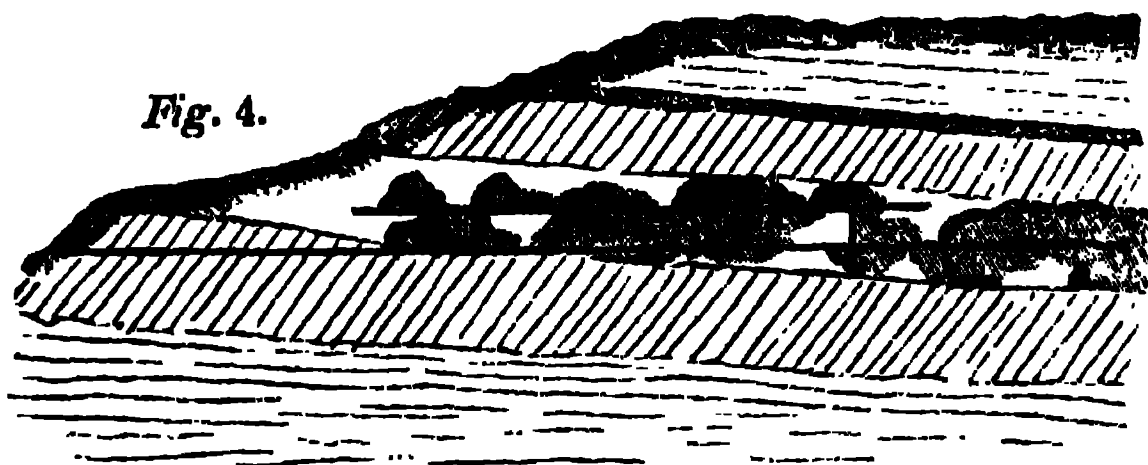
Adits.—Where a vein has been worked by driving a level towards it from a valley or other convenient point on the surface, the drainage to the point of intersection is, of course, complete; and hence in mountainous countries, where deep ravines occur, levels may be brought in one below another, so as to prove the veins and unwater the mines to a considerable depth, almost superseding the use of machinery for this purpose. Levels thus opening to the surface, and serving for drainage, are termed 'day-levels' or 'adits,' and few mines are without one. In cases where mines have been opened by sinking down from the surface, which is the most common method, an adit is generally commenced from the bottom of some neighbouring valley (see *fig.* 2), which is driven towards the vein with a slight inclination, so that the water may readily flow through it; and in large mining districts adits have been formed of enormous length, traversing a considerable number of mines, and carrying off the water to the lowest practicable point of drainage. The most remarkable work of this kind in England, or perhaps in the world, is the 'great adit' which traverses the extensive mining district of Gwennap, in Cornwall: it commences in a valley near the sea, and very little above its level, and has been extended through all the neighbouring mines, which it drains to that depth, the entire length of its ramifications being estimated at no less than thirty miles. The celebrated Nent Force level, in the north of England, forms a similar drain to the numerous mines on Alston Moor, and has been driven in a direct line between three and four miles, independently of its minor ramifications. In driving an adit, if the length be considerable before it reaches the mine which it is intended to drain, the distance is often divided into two or more portions by sinking shafts upon its course, and driving from the bottom of each on reaching the requisite depth. The work is thus expedited in proportion to the number of points from which operations may be commenced. Adits may often be made valuable as works of discovery, by making them cross the direction of the veins occurring in the district, so as to intersect them in their course, when they afford the means of trial at a cheap rate, by driving upon them at the points of intersection. In some cases adits may be carried almost entirely upon veins, to which they thus afford an important trial.

It is evident that the shafts and levels may be indefinitely extended in the manner which has now been pointed out, and should the produce of the mine be considerable, the portions of the vein successively laid open continue productive, and other veins be discovered by cross-cutting in its vicinity, this extension of the works may be continued for many years. Thus, in the course of time, from a few simple excavations, we obtain that almost infinite complication of

shafts, levels, cross-cuts, and other workings, which characterise the workings of an extensive mine, with all its numerous appendages of pumps, machinery, and buildings.

The operations which have now been described are applicable to all large and regular metalliferous veins situated in countries where no distinct stratification exists, and where therefore, from the homogeneous nature of the rock, the metallic produce may extend to very considerable depths without any great fluctuation. The mining districts of Cornwall, and those of Germany and Mexico, are chiefly of this class.

Mining in Stratified Districts.—In working mineral veins in distinctly stratified countries, this geological feature has a great influence on the arrangement of the subterranean works, as it impresses a peculiar character upon the contents of the veins, the metalliferous portions of which are in great measure confined to certain strata, while the intervening parts are poor and unproductive. Thus, instead of exploring the whole mass of the vein, as in the former case, it is only necessary to lay open those limited zones which are embosomed in the strata most favourable to enrichment, and to which therefore the workings are chiefly confined. The lead-mines of North Wales, of Derbyshire, and of the North of England, are worked in the carboniferous limestone, and the grits and shales resting upon it, the two former being the productive rocks. In these mines therefore the mode of working above noticed is adopted, and, from the abrupt and mountainous nature of the country, great facility is afforded in carrying on the subterranean works, which are generally executed in the following manner. A point is selected in some valley or ravine where the edges of the strata are exposed to view, and from thence a level is commenced, if practicable, upon the vein itself, and in one of the beds known to be favourable to its enrichment, the progress of which effectually explores its produce, and admits of a convenient extraction of the ore. Should the vein itself not appear in any spot from which it can be directly driven upon, the level is driven as a cross-cut till it is reached, being either carried on one of the productive strata, or in some other bed adjoining them which may afford greater facilities for driving. Whenever bunches of ore are found in the progress of this level upon the vein, excavations are carried upwards and downwards into them, as far as the ore extends, thus laying it open in a convenient manner for extraction. Should the ore extend far enough towards the surface to render it necessary, levels may be driven from the 'rises' to render it more accessible, and should another productive stratum be situated at no great height above the first, similar operations will be extended into that also. The vein having thus been laid open, the masses of ore are placed in a proper state for working; they are broken from the vein either by the pick or by blasting, and the works so arranged that the stuff falls at once into the level below, whence it is transported in tram-waggons to the entrance, near which the dressing-floors are usually placed. *Fig* 4 represents the section of a mine worked in the above manner.



As the principal level of a mine worked in this manner is always, when possible, carried at or near the bottom of the lowest productive stratum, the whole process of working may often be carried on by rises, and no necessity will exist for sinking below the main level, which answers the purposes both of drainage and extraction. When however other productive strata exist below this, which from the nature of the country are inaccessible by day levels, recourse must be had to sinking winzes below it to explore them.

When a level has been driven a considerable distance from its mouth or entrance, a shaft will be required, which is usually sunk from the surface so as to come down upon it near the end. The deeper workings are then carried on by means of this shaft, which is either continued perpendicularly or upon the vein, till it reaches the next productive stratum, upon which a level will be driven. By extending the day level or adit upon the course of the principal vein, and such others as may be found in its vicinity, and by sinking shafts occasionally where they may be found necessary; a mine worked in this manner may be indefinitely extended, and its workings arranged so as to be accommodated to the nature of the metalliferous deposits which may be discovered in their progress.

Although the general principles which regulate the direction of mining operations will best be understood from thus tracing their most important modification from the beginning to a mature and systematic development, it must not be supposed that all mines are invariably worked upon the same plan, or even that the first opening of mines is a thing of very frequent occurrence. The local circumstances of mines are so exceedingly various, and the irregularity and complexity of mineral deposits so great, that a corresponding diversity must exist in the means adapted for exploring them, and hence, although the general principles and features are the same in all, no two mines will be exactly alike, nor would the same unvarying processes be suitable for them.

Mining Tools and Processes.—The tools and processes employed by the miner in the excavation of the rock or the vein are simple, and will require only a brief notice. As his work is chiefly of two kinds, simply *excavating* the ground when soft, and *blasting* it when hard, his tools are suited to each process, the 'pick' and 'gad' being used for the former; the 'borer' or 'jumper,' and the 'hammer' used to propel it, for the latter, with several minor accessories for firing the shots, when the hole has been completed to its proper depth. The *pick* is a very useful tool and much employed by the miner both in working in the rock and in breaking down ore where the ground is not so hard as to require blasting. It resembles a common pickaxe, but is smaller and more convenient, the iron head being sharp and pointed at one end, and very short and hammer-shaped at the other, a form which peculiarly adapts it to under-ground uses. The *wedge* or 'gad' is sometimes used in conjunction with the pick; it is made of wrought iron, and often with curved sides. The *borer* or 'jumper' is an iron rod or circular bar usually about two feet in length, steeled and formed into a flat sharp edge at the end; it is driven into the rock by one man with a heavy hammer, while the other continually turns it round so as to expose the cutting edge to fresh surfaces of rock. The pulverised matter is drawn out from time to time by a tool called a 'scraper,' and when the hole has proceeded to a sufficient depth, and been charged with powder, an iron wire with a copper point, or, what is still better, a piece of copper wire, with a loop at the end, is introduced, when the charge having been firmly rammed down with clay or other soft mineral substance, the wire or 'needle' is withdrawn, and a train of gunpowder inserted in its place. The train is then fired by a slow match (often a piece of brown paper smeared with grease), and the miners retire till the explosion has taken place. A very ingenious contrivance for firing the charge was invented some years ago in Cornwall by Messrs. Bickford, called the 'safety fuse,' which is now getting into very general use in our mining districts. The safety fuse consists of a small train of powder inserted in a water-proof cord, and being cut to the required length, regulates the time of the explosion by its known and steady rate of ignition. The use of this contrivance and the substitution of copper for iron in the 'needle,' have contributed of late years to prevent the accidents arising from premature explosion, which were formerly of very common occurrence in mines.

Auxiliary Operations.—Having now considered mining in the most simple point of view which the subject admits—as the arrangement of a system of subterranean works adapted to effect the great objects of discovery, extraction, ventilation, and drainage, it remains to notice the various auxiliary operations which the progress of these works will have required, and the complicated machinery which will thus have been called into action, both on the surface and under ground. The auxiliary works in question will have been directed towards two distinct objects, one portion of them being subsidiary to the actual working of the mine itself, and the other directed to the mechanical preparation of the ores extracted, so as to render them fit for the smelting works, to which they are finally consigned for reduction, this last process being sometimes carried on upon the spot and by the same parties, and in other cases being per-

formed at a distance by a distinct agency. We now proceed to consider the former of these two classes.

The underground works of a mine will not have proceeded far before it becomes necessary to provide for several very important contingencies: water filters rapidly in, and, excepting where mines are worked by day levels or adits (or even then on sinking below them), requires some power to be provided for drawing it out; excavations are formed which require support; ventilation in places requires to be aided by mechanical means; and lastly, the continually increasing extraction of ore and rubbish renders powerful and efficient means indispensable for its discharge.

Drainage; Horse-Whim.—The drainage of a mine is one of the earliest things which it becomes necessary to provide for, as mineral veins are generally more open and porous than the surrounding rock, and thus form natural reservoirs into which the surface water collects. When penetrated by the workings of a mine, this natural drainage is rendered still more complete, and water pours abundantly into the excavations. The most obvious mode of relief, where local circumstances are favourable, is of course the formation of an adit, but excepting in very abrupt and mountainous countries, where this work can be readily executed, mechanical power soon becomes necessary. This may be in the first place afforded merely by a 'horse-whim,' which will serve to raise both the water and the stuff broken in sinking; and in Mexico, before English skill and capital were applied to the working of the mines, this simple apparatus was the only power used in their drainage and extraction. Its application on the large scale is however so enormously expensive, so complicated, and so inconvenient, that in the mines of Europe it is only used upon a limited plan, and mechanical power is substituted as soon as possible for animal labour. The machine alluded to consists of an upright shaft carrying a large cylindrical cage or drum, and turned round by a long lever to which the horses are attached. A rope is coiled round the cage of the whim, with both ends at liberty, so that while one end is winding up, the other is unwinding, and both pass over a pulley placed above the shaft, having large iron buckets or kibbles attached to them, which by this arrangement are kept alternately ascending and descending, one kibble being loaded at the bottom while the other is emptied at the surface. This apparatus is termed a 'whim' in Cornwall, but in the north of England a 'whimsey' or 'gin.' Where mines are not very deep it is a convenient auxiliary in the extraction, but is only useful for drainage when the quantity of water is very trifling, as in sinking a mere trial shaft. See *fig.* 5.

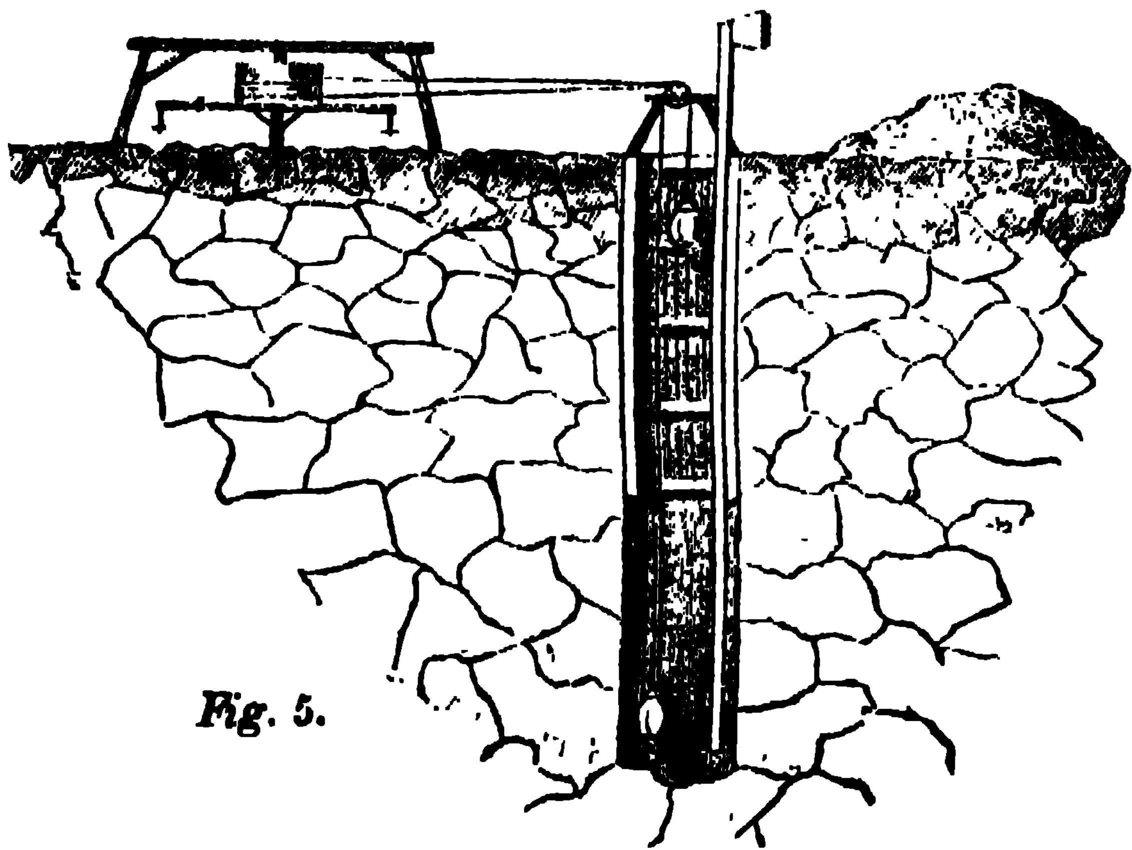
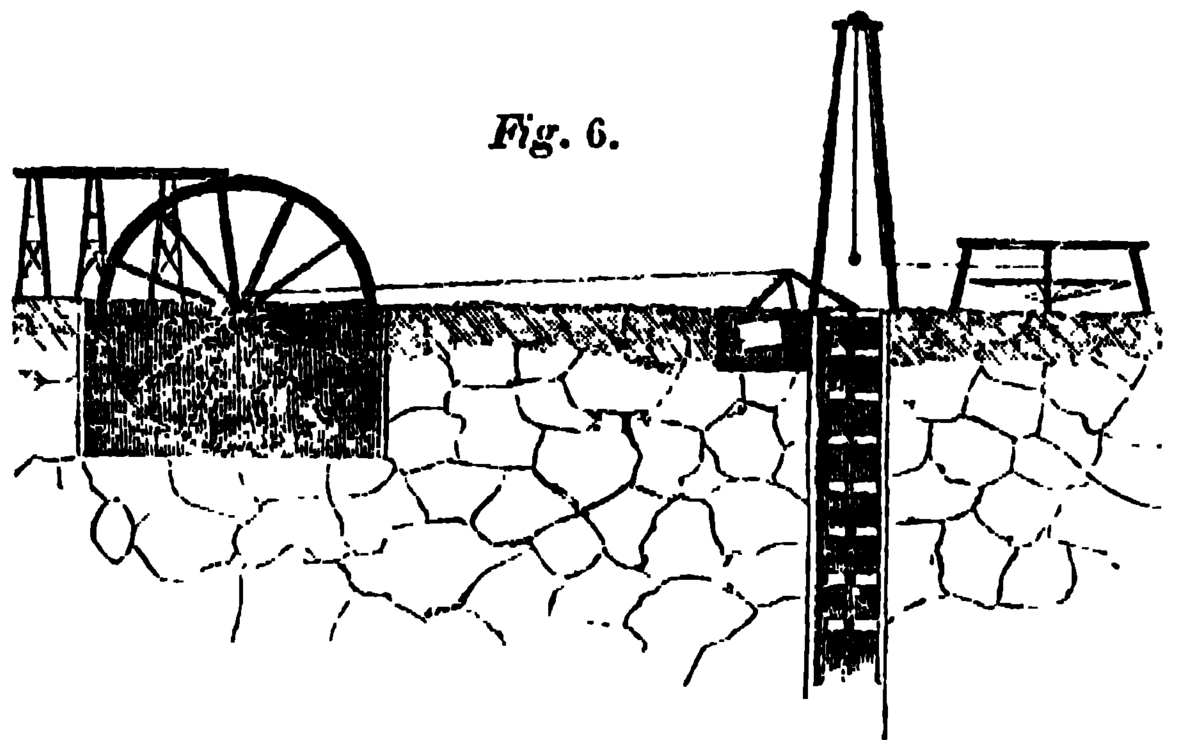


Fig. 5.

Water-wheel.—When the influx of water in a mine becomes at all considerable, recourse must be had to the power either of water or of steam to discharge it to the adit, or the surface, as the case may be. Should local circumstances be favourable to the application of water-power, it will of course have the preference, being recommended both by its economy and steadiness of action. The nearest stream of water available for this purpose will be turned into an artificial watercourse, or 'leat,' and conducted to the mine so as to obtain a sufficient fall to turn an overshot water-wheel, whose diameter and width will be regulated to receive it. Where a constant and abundant supply of water can be obtained, this power becomes extremely valuable, and the miner avails himself of it with great ingenuity, constructing large reservoirs in the valleys through which the stream passes, to render the supply more equable in time of drought, and erecting as many water-wheels on the mine, each receiving its supply from the tail of the other, as the declivity of the ground will admit. The water-wheels used in mines are invariably overshot; they vary from 10 or 12 feet in diameter to more than 50, and from 2 or 3 to 6 or 7 feet in breast: some of the largest exceed 100 horse-power. The German miners have long been celebrated for their skilful application of water-power, which, from the mountainous nature of their mining districts, early presented itself to their notice. In this country, from the general application of the steam-engine to the drainage of mines, it has been less cultivated; but many fine instances of its use may be seen in some of our mines, where circumstances have been favourable to its adoption. Among these may be named the Fowey Consols Mines in Cornwall, the mines of Wheal Friendship and Wheal Betsy in Devonshire, and of Grassington in Yorkshire. The application of a water-wheel to the drainage of a mine is shown in *fig.* 6.

Fig. 6.



Pumps.—During the erection of the water-wheel pumps are fixed in the shaft, proportioned in size to the quantity of water to be drawn, 10 or 12 inches in diameter being a very common size, where there is only a moderate influx. The pumps used in mines do not act at all by atmospheric pressure, as in the case of the common household pumps; they are arranged in 'lifts,' or columns, of considerable height, often indeed from 20 to 30 fathoms, the water being discharged into cisterns placed at the foot of each, and raised entirely by lifting or by pressure. The construction and arrangement of the pump-work forms a very important branch of mining, and one which, from the great depth of our mines, and the vast influx of water so common in them, has been much cultivated in this country, and consequently brought to great perfection. Wooden pumps were formerly common in mines; but they have for a long while been entirely superseded by iron ones, which admit of the lifts being carried to a great height without leaking, or the danger of bursting. The whole column of pumps in a shaft is commonly worked by a single pump-rod, which goes down the middle of it and communicates with each column by a rod attached to its side. In order to give a reciprocating motion to the main pump-rod, a crank on the axle of the water-wheel is attached to one end of a horizontal rod, the other end of which is fixed to an apparatus termed a 'bob,' consisting of an upright post moveable on a centre, and firmly braced to a horizontal piece framed into it at the bottom, the further end of which is connected with the pump-rod. In this manner it will be seen that the rotatory motion of the water-wheel is converted into a steady reciprocating motion when communicated to the pump-rod, the weight of which is always counterbalanced by a large box filled with stones, old iron, &c., which is attached to the opposite end of the balance-bob (see *fig.* 6).

As the power of the water-wheels used in mines is entirely due to the gravity of the water, or the force it exerts in falling through a given space, minus the effects of friction, it is only where a considerable stream can be obtained that water-wheels of sufficient power can be erected; but in cases where the supply of water is very limited, and it is practicable to obtain a considerable fall, there is another very ingenious mode of applying it, by which the principle of hydrostatic pressure is called into action. This contrivance is termed the 'water-pressure engine,' and is a good deal used in the German mines, though only to a limited extent in this country. The principle consists in giving motion to a piston by the alternate pressure of a high column of water, which

having performed its office, the communication is cut off, and the water in the cylinder escapes. The apparatus is not in fact unlike the working portion of a steam-engine, the hydrostatic pressure of a column of water being substituted for the force of elastic vapour, and the reciprocating motion thus produced may be directly applied to set the pumps of a mine in action.

Steam-engine.—From the great abundance of coal which exists in this country, and the cheap rate at which it can be generally obtained, the steam-engine has long been the great auxiliary of the English miner, and in its present improved state it has greatly contributed, as before noticed, both to the perfection of our mining system and the enormous extraction of minerals and metallic substances by which our mines are distinguished. In our coal-mines, where the fuel is of scarcely more than nominal value, the steam-engine is the only power ever employed for drainage, and in all deep and extensive works for extraction also. In our copper, tin, and lead mines, on the contrary, where the carriage of coal renders the use of it more expensive, water-power is always, as far as possible, rendered available. In all the deepest and most extensive mines of this description the steam-engine is however indispensable, and both the drainage and extraction have been in great measure performed by it, since its use has been so greatly economised by the reduced consumption of coal consequent upon late improvements.

The history and progressive improvements of the steam-engine are so intimately connected with its general application to mining purposes, and consequently with the present perfection which the art of mining has attained, and the vast produce afforded by our mines, that it requires some brief notice here. The efficiency of a steam-engine for mining purposes is estimated in Cornwall (where, from the great expense of coal, all the late improvements have originated) by the standard termed *duty*, which accurately and conveniently defines the work performed, with reference to the consumption of a given quantity of coal. Thus, by the duty of an engine is expressed the number of pounds (always millions) of water which have been raised through the height of one foot by the consumption of a bushel of coal, the data for this calculation being the quantity of water discharged from the pumps in a given time, and the quantity of coal consumed by the engine in the same period. This mode of calculating the efficiency of steam-engines was first practised by Watt, who thus estimated the saving of fuel effected by his engine compared with the atmospheric engine perviously in use, one-third of this saving being the remuneration claimed by him for the use of his invention. An admirable system for the registration of the duty and other peculiarities of the engines employed in Cornwall was organised in the year 1813, and this system has been ever since continued, the results being monthly ascertained and published in a convenient form. The effect of this system has been to excite an extraordinary degree of competition among the engineers, each of whom strives to improve the duty of his engines in every possible manner. The improvements which have thus resulted have been so unexpected and so extraordinary as to excite suspicion and incredulity among those engineers who resided in other parts of England, which have only been removed by the most rigorous scrutiny and experiments.

The progressive improvement of the duty of steam-engines has been very accurately traced by Mr. John Taylor, in his 'Records of Mining;' and the following is a summary of the results which he obtained:—

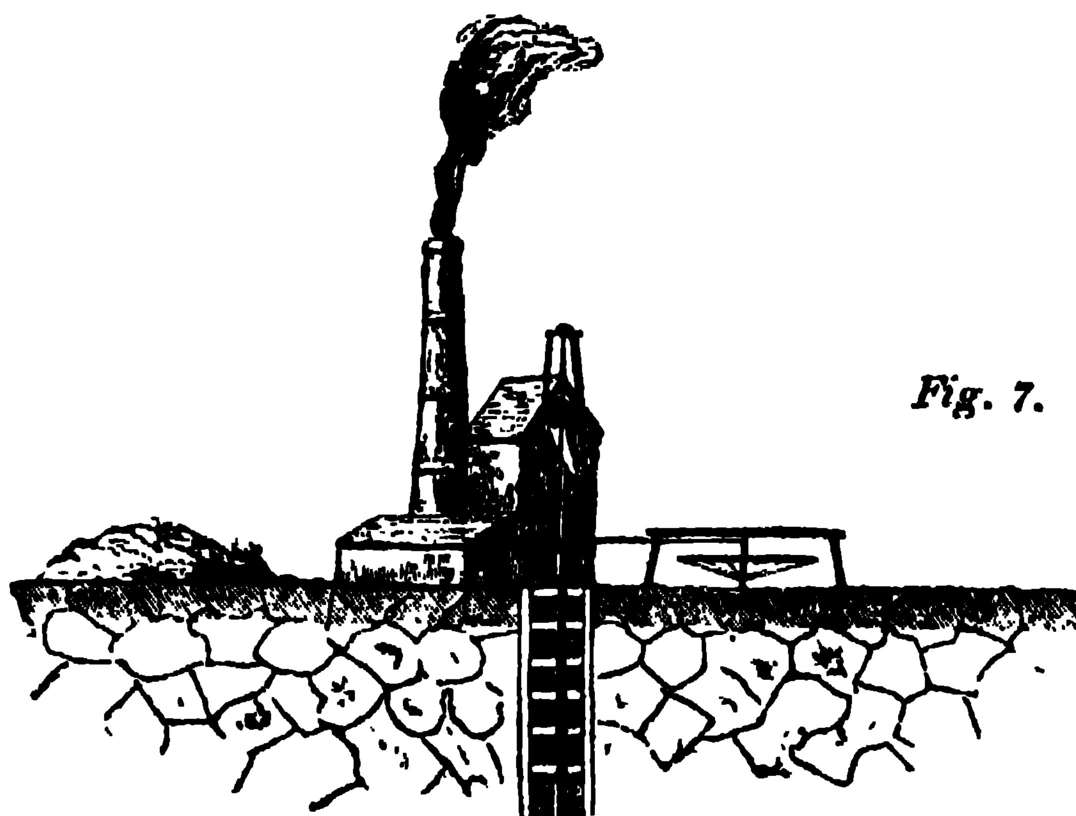
In 1769	the old atmospheric engine, by consuming a bushel of coals, raised	5,500,000	lbs.	1 ft. high
„ 1772	as improved by Smeaton	9,500,000	„	„
From 1778 to 1815	the steam-engine as improved by Watt . .	20,000,000	„	„
„ 1820	as improved by the Cornish engineers .	28,000,000	„	„
„ 1826	„ „	30,000,000	„	„
„ 1827	„ „	32,000,000	„	„
„ 1828	„ „	37,000,000	„	„
„ 1829	„ „	41,000,000	„	„
„ 1830	„ „	43,350,000	„	„

During the present year (1839) the duty has advanced to 54,000,000, at which it was stated in the usual return for the month of April last.

The above statement, it should be observed, refers only to the average duty, many of the best engines having always greatly exceeded this; and at the present time the duty of the best engines in Cornwall varies from about sixty to eighty millions. In the latter case therefore one bushel of coal performs as much work as fifteen bushels effected seventy years ago, or as was accomplished by four till within the last five and twenty years. When it is stated that some of the most powerful engines in Cornwall consume from three to four thousand bushels of coal per month, that some mines employ several of such engines, and that the mere expense of drainage is 12,000*l.* or 13,000*l.* per annum, the vast importance of the improvements above noticed will at once be appreciated.

Independently of the vast and practically unlimited power which the steam-engine places at our command, it may be considered as universal in its application, and entirely unrestricted by those limitations of local circumstances which circumscribe the utility of all other modes of drainage. The steam-engine may be erected on any spot which convenience requires, and possessing whatever degree of power may be considered requisite; fuel and water alone are needed for its operations; and while successive improvements have reduced the former to a fraction of its earlier consumption, it can always supply itself with the latter from the ground. This independence of local circumstances is of the more importance to the miner, as it is not in his power to make choice of localities: the manufacturer may erect his mill wherever water-power is abundant for driving his machinery, but the miner must carry on his operations on whatever spot nature has deposited her mineral treasures, and make the best of circumstances over which he can have no control. Thus the steam-engine smokes in the narrow valleys of Cornwall, almost at the sea-level, on the verge of the cliff at Botallack, and on the elevated table-land of Mexico.

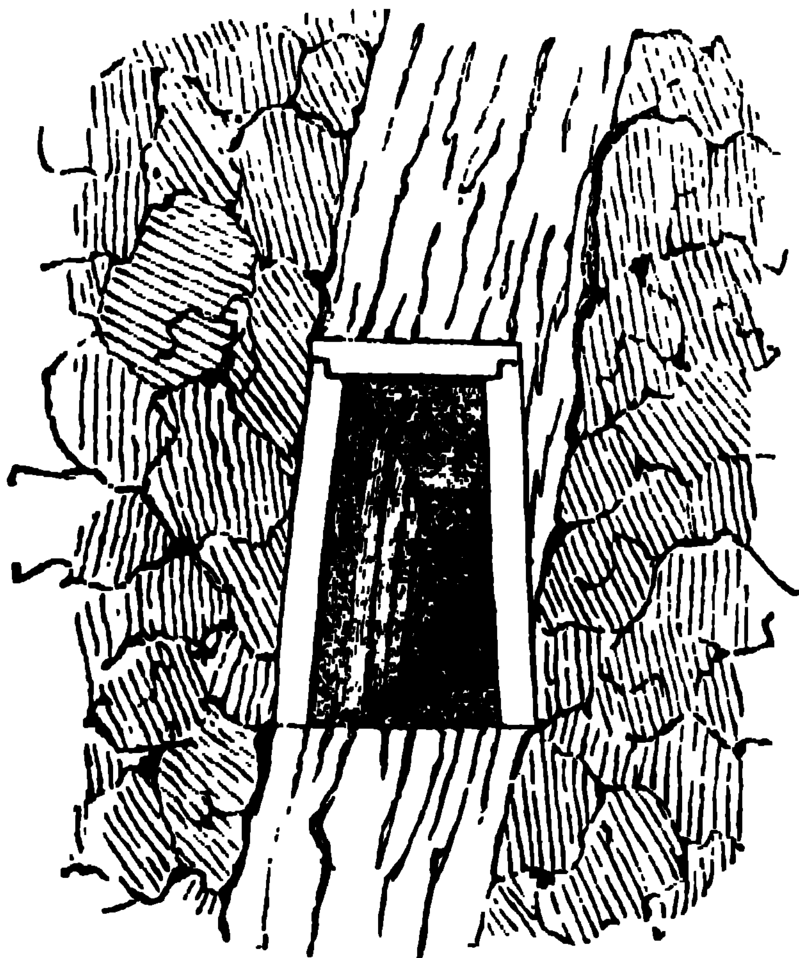
The steam-engines employed for drainage are erected close to the shaft in which the pumps are fixed, which is called the 'engine-shaft;' one end of the beam hangs over the centre of it, and is attached to the pump-rod, which is raised at each stroke of the engine, afterwards sinking with its own weight, which is always counterbalanced by a 'balance-bob,' as before explained, so that the whole power of the engine is exerted in raising the column of water in the pumps. The engine is generally enclosed in a large substantial building, either two or three stories high, which affords convenient access to every part of it. The centre of the beam is supported by the front wall of the house, and a low building attached to it contains the boilers, which in Cornwall, together with the steam-pipe and cylinder, are carefully cased and covered up with some non-conducting substances. The arrangement of the engine, with that of the 'capstan' and 'shears' used in raising and lowering the pit-work, is shown in *fig.* 7. The engines employed in draining


Fig. 7.

mines have generally cylinders of not less than 40 inches in diameter, and the cylinders vary from that size to a diameter of 80 or 90 inches, the latter being the largest size ever constructed, and estimated at 300 horse-power. The chief peculiarities of the Cornish engines consist in using high-pressure steam (40 or 50 lbs. to the square inch) expansively, by cutting off the communication with the boiler at one-fourth or one-fifth of the stroke; in allowing a short interval between each stroke for the perfect condensation of the steam, and in carefully preventing the radiation of heat from the boiler, cylinder, &c. The engines employed in our

collieries present no peculiarity worthy of notice, nor has any great attention been paid to their improvement, owing to the cheap rate at which they can be supplied with fuel.

Support.—The support of mines is the next subject which requires our attention, and the extent to which it is necessary will depend very much on the nature of the enclosing rock, which may be either so hard as to stand of itself, or so soft as to crush together unless the excavations be properly secured. The mode of support used in mines is of three kinds—by leaving pillars of the vein, as before noticed, for which purpose the poorer masses are of course selected; by timbering; and by walling either with brick or stone. Timbering is a very common and convenient plan, and is thus practised:—In the case of a shaft, four pieces of timber of the requisite strength are framed into each other and fixed within it at intervals of about four feet apart, the intermediate ground being supported by driving thin boards between each set of timbers and the rock. Levels are supported by three pieces of timber placed in the form of a doorway, rather narrower above than below, and framed together at the top (see *fig.* 8), the ground between each of


Fig. 8.

these doorways being supported in the manner above noticed. Shafts and levels are sometimes also supported by walling, and in coal-mines the pits are generally lined throughout with brick-work. The 'gunnies,' or large open excavations from which the ore has been taken, are kept open by strong pieces of timber placed across them, and pressing against the two walls of the vein, which they thus prevent from closing together, as might otherwise be the case, especially where the vein was much inclined, and the pressure of the unsupported hanging wall is consequently great. These open spaces are very useful for disposing of the deads and rubbish which are continually accumulating underground when the workings are carried on in the rock or in unproductive parts of the vein, and which it would be useless and expensive to raise to the surface. For this purpose a 'stull' is formed by placing strong timbers in the backs of the levels, upon which boards are laid, so as to form a close covering on which the deads and attle (or rubbish) are then thrown, till the space above has been completely filled up. The pressure of this mass gives it sufficient solidity to support the walls of the vein in an effectual manner; but notwithstanding the large quantity of rubbish thus disposed of in mines, a great deal always remains to be taken to the surface, as the waste heaps on the surface of every mine will show.

Ventilation.—The ventilation of mines is most generally and most effectually accomplished rather by a judicious arrangement of the works and frequent communication with the surface than by mechanical means, although it sometimes becomes necessary to resort to the latter. It will be evident that in mines constructed on the principles which have previously been explained, the disposition of the shafts, levels, and winzes is such that the entire workings will always be traversed by currents of fresh air, and it is only in particular cases where circumstances prevent the sinking of a shaft in places where it may be required, or where great delay is experienced in effecting the usual communications, that any mechanical process of ventilation is rendered necessary. A very efficient machine for this purpose was invented some years ago by Mr. John Taylor. It consists of a cylindrical exhausting apparatus, which may be fixed at the mouth of a shaft or level, and placed in action by any convenient power, when, by means of a series of tubes connected with it, the foul air is extracted from the interior of the works, and of course the pure atmospheric air rushes in to supply its place, and complete ventilation is thus effected. In sinking shafts a very simple contrivance is often found sufficient; small wooden pipes made tolerably air-tight are fixed in the pit from near the bottom to six or seven feet above the top, terminating in a funnel-shaped wooden box, which is moved round so as always to face the wind. The air rushing in passes down the pipes to the bottom of the shaft, in which a constant current is thus kept up (see *fig.* 5). When levels have to be carried to any great distance without any communication with the atmosphere, they are sometimes divided by a 'sollar,' or wooden platform placed a foot or two above the bottom, and in this manner a sufficient current of air is obtained to enable the miners to proceed. In the north of England a contrivance called the 'water blast' is often used in driving long levels into rising ground; it consists in putting down either a bore-hole or small shaft near the end of the level, and turning a small stream of water into it, which falls into a cistern placed at the bottom, and is found to carry with it a sufficient current of air to ventilate the works. In coal-mines the ventilation is much more difficult, and, from the rapid generation of explosive gases, more important also. It is generally effected by two shafts, one of which is called the 'downcast, and the other the 'upcast shaft,' the latter of which occupies the highest situation with reference to the dip of the coal, and has a large furnace continually burning near the bottom of it. The air being considerably rarefied at this point, an ascending current is formed, which passes upwards to the surface through the upcast shaft with considerable velocity, causing a descending current to pass through the downcast shaft to supply its place, and by a very ingenious arrangement of the workings this current of pure atmospheric air is made to traverse every part of the mine in succession as it passes from one shaft to the other.

Extraction.—The extraction of mines will require but little notice here, since it may be stated in general terms merely to require the adaptation of an efficient prime mover to any convenient form of winding apparatus, a purpose for which the steam-engine is very usually employed, although where water-power can be obtained it is equally effective. The horse-whim, or gin, as already noticed, is very useful in small mines or isolated workings, and before the introduction of more powerful machinery was very extensively employed for raising ore and stuff from our mines. In shallow preliminary excavations the common windlass is often employed, and in underground work is much used for various purposes, especially in sinking winzes, and raising the stuff from workings where no regular communications have been opened. The extraction of an extensive mine is enormous; indeed the quantity of ore raised is seldom more than one-third or one-fourth, sometimes indeed a fifth, or less, of the mass of stuff which is brought to the surface. At the Consolidated Mines in Cornwall the daily extraction is about 200 tons, a large proportion of which is raised from a depth of from 200 to nearly 300 fathoms. In the coal mines in the north of England the extraction is still greater, but here nearly the whole of the mass raised is more or less valuable, coal-mines being much less encumbered with dead or unproductive works than those of the metals. The South Hetton Colliery in Durham sends about 600 tons of coal 'to bank' daily, and is capable of affording a much larger extraction.

Mechanical preparation of Ores, or Dressing.—Having now traced the nature and progress of those subterranean works by which access is obtained to mineral and metalliferous deposits, and their produce extracted, we may briefly glance at the mechanical processes of separation, technically termed 'dressing,' which fall within the province of the miner, and to the carrying on of which a large portion of the surface-works of every mine is devoted. The object of dressing is to separate as far as possible the earthy matter accompanying, and, as before noticed, often mixed up with the ores, from the metallic portion, which is alone valuable; and the great principle upon which all the varied apparatus and processes which are used in different mines, and in different countries, to effect this purpose, entirely depend, is the difference in specific gravity between earthy and metallic matter, the one being generally double that of the other.

The dressing-floors of a mine are always arranged as near the mouths of the principal shafts and levels as possible, the ore being conveyed to them by a small railway; and they are always provided with an adequate supply of water by an artificial channel or 'leat.' The floor itself is paved, and there are on one or two sides ranges of sheds for the persons employed to work in, and buildings containing the apparatus used in the operation, which commences by picking the ore, which is brought from the mine in large irregular lumps, as blasted or broken from the vein. These lumps, of which more than half is often merely spar and veinstone, are broken into smaller pieces with hammers, an operation commonly performed by boys and young women, when a good deal of the sparry matter is picked out by hand and at once rejected: the residue is moderate-sized pieces of ore, more or less mixed with veinstone, and often nearly free from it. From rich veins a large proportion of the ore is obtained in a very pure state, and in this case it is only necessary to break down the large irregular masses into small fragments of a pretty equal size, in order to render it marketable and fit for the furnace, there being no earthy or sparry matter to separate from it. This rich ore is immediately therefore arranged in circular heaps upon the dressing-floors, containing a certain number of tons each, commonly fifteen or twenty, and in this state it has much the appearance of fine metallic gravel. The poorer class of ores, after being broken by hammers, and partially separated from the matrix by picking, have still a great variety of manipulations to undergo, which depend on the nature of the metal and the quality of the ore itself. Of these processes it will be sufficient here to notice three, 'crushing' or 'grinding,' 'jigging,' and 'stamping,' each of which is performed by an appropriate machine. The crushing-mill, or grinder, consists of one or more pairs of iron rollers, placed within a very short distance apart, and kept in motion either by the direct action of a water-wheel or by cog-wheels attached to it. Immediately above the rollers is a hopper, into which the lumps of poorer ore are thrown, when, falling through between the rollers, they are completely crushed into small fragments. In some crushing-mills there are two or three pairs of rollers, those below being placed very near together, so as to reduce the stuff falling from above still finer, and by an ingenious application of sieves, kept in motion by the machine, the stuff can be sorted into two or three different sizes. Although by passing through the crushing-mill the ore, with its accompanying veinstone, has been reduced to very small fragments, the two substances are still as completely intermixed as ever; but in the next process, by the jigging-machine, or 'brake-sieve,' they are, to a considerable extent, separated. This machine consists of a wooden frame, open at the top, and provided with a strong screen, or iron grating, at the bottom: it hangs over a cistern of water, being suspended to a long lever, the motion of which alternately plunges it into the water and raises it out, with a peculiar jerk each time. The ores being placed in the sieve, and subjected for a short time to this operation, the heavy metallic pieces settle at the bottom, while the lighter fragments of spar and veinstone are thrown to the top, and every now and then very dexterously skimmed off with a piece of board by a man who stands by. In the operation of jigging, a very important separation is thus effected, as three products are obtained by it—the small rich particles of ore, which pass through the sieve into the cistern below, and are removed occasionally, as may be necessary; the larger rich fragments, which occupy the bottom of the cistern; and the poor earthy matter, which forms a layer at the top. This last product, although poor, still contains too much metal to be lost: it consists of small fragments of rock or veinstone, many of which have small particles of ore either attached to them or intermixed with them, and, to any eye but that of the miner's, would appear quite worthless, no less from the small quantity of the ore than the manifest difficulty of separating it from such a mass of stony matter. To extract the ore from this refuse matter, several processes are used, which are chiefly grinding between rollers placed very close to each other, stamping to a fine powder by the stamping-mill, and finally, washing upon an inclined plane. In this operation the fine metallic mud or 'slime,' being carefully spread over the inclined plane at the upper end, a gentle stream of water is allowed to flow over it, which washes the light earthy particles towards the bottom, leaving the heavier metallic ones in a very pure state towards the top. As in this process, and indeed all other operations of dressing in which a stream of water is employed, many of the smallest and most minute particles of the ore are carried away by it, the waste of which, in an extensive mine, would be considerable, it is arranged that all such water shall pass into successive reservoirs, termed 'slime-pits,' in which the metallic particles fall to the bottom, and are from time to time collected and subjected to such treatment as to obtain them in a tolerably pure state, as a good deal of earthy slime is always deposited with them.

It will be seen from the preceding notice that by repeated pulverization, washing, and agitation, the metallic ores may be obtained at length in a very pure state, the earthy matter with which they were originally intermixed being by these processes almost entirely separated from them. When subsequently placed in the furnace, this residual earthy matter becomes fused together with limestone, used as a flux, and forms the vitrified matter termed 'slag;' while by continued heat, the sulphur, oxygen, and other mineralizing substances, which are in a state of chemical combination with the metal, are entirely driven off, and the latter obtained in a pure state. These operations constitute the process of metallurgy.

Variations of the Process.—Any further detail on the subject of dressing would here be out of place; yet it is necessary to observe that different ores require different processes, and that the general outline indicated above is thus subject to considerable modification. In the case of tin ore, which is very intimately disseminated in the rock or veinstone, a very minute pulverization is required: hence stamping is most extensively practised in our tin-mines; and as the ores of this metal may be dressed so as to give a produce of 50 or 60 per cent., very great attention is paid to this point, and the various manipulations are carried on with a greater degree of attention than in the case of other metals. In the case of copper ores stamping is less used, but jigging forms a very important process, and has consequently undergone great improvements of late years, having given rise to a very ingenious and useful invention, called the 'patent separator,' in which the sieve is stationary, but the water kept in motion. This contrivance was invented by Mr. Thomas Petherick, late manager of the Fowey Consols Mines in Cornwall, where it has for several years been in successful operation. The ores of the precious metals require also a peculiar treatment, being generally in a state of minute subdivision, and mixed up with a vast mass of earthy matter. Gold ores are usually stamped, and silver ores ground to an exceedingly fine powder; but from the great value of the metals, the process of washing is carried on differently from that of others, and, in some cases, is dispensed with altogether.

Management and Internal Economy of Mines.—Having now taken a general view of mining operations, and the auxiliary processes which they require, there is still an important branch of the subject which requires some notice, the management and internal economy of mines. As it is on the due regulation of this point that the success of mines in a very great degree depends, it has, both in this and other countries, received great attention, and been reduced to a system as perfect as possible. In England, more especially, all the practical improvements suggested by experience as essential to the profitable and well-regulated existence of large mining establishments have been freely adopted, as we are here unfettered by those formalities and restraints which influence the continental systems, individual interest being allowed a full and unlimited scope. The nature and importance of the subject now under consideration cannot be better expressed than in the words of a gentleman of the highest eminence as a mining-engineer, Mr. John Taylor, who has thus treated it, in connection with late mechanical improvements in the art of mining:—

'Important as the improvements are which we have contemplated in the instruments which the progress of physical science has placed in our hands, those which relate to the government of large bodies of workmen, to the inducement to active enterprise on the part of the labouring miners, to the removal of difficulties in their way, or of placing them in circumstances most favourable to effective exertion, are even more important, and to this may be added the judicious application of those very inventions which have been noticed. It must be recollected that, after all, the great expenditure in mining is for manual labour, and that we have no means as yet devised for penetrating the rocks which contain mineral treasures but those afforded by the patient and unre-

mitting labour of a great number of men. The regulation therefore of this force, and its due application, is, after all, more important to the success of mines than even the most ingenious mechanical expedients. As an army would undoubtedly fail, however well provided with the most perfect artillery and all the best constructed implements of war, unless the men of which it might be composed were well directed, their efforts well combined, and their courage well assured by reasonable prospects of success, so in mining we may collect and apply the most complete mechanical arrangements; out if the greater power of manual labour be not wisely directed, no beneficial results can be expected.'

System of Tutwork and Tribute.—Such being the leading features of mining economy, we may proceed briefly to consider the manner in which they are practically carried into effect, more especially in the deep and extensive mines of Cornwall, where, both from the amount of capital and the number of men employed, every exertion has been made to perfect the mining system, the results of which have since been extended from thence to other parts of England. All the underground work of mines in Cornwall, and indeed of most other districts, is of two distinct kinds: dead work, or that carried on in the rock or metalliferous deposit, for the purpose of trial and discovery; and productive labour, which is employed in the actual breaking down and extraction of the ore. Now it is in the performance of the immense amount of manual labour requisite in these operations, and in the subsequent process of dressing the ores, that the great expenditure of mining consists; and the great merit of the Cornish plan lies in performing the whole by a system of contracts, which effectually unite for a time the interests of the miner and his employer, while, being renewed at moderate intervals, it continually allows of that re-adjustment which the fluctuating circumstances of the mine may require. The dead work is denominated 'tutwork,' and the raising of ores 'tribute;' these two species of employment being, by an excellent division of labour common in all mines, kept entirely separate and performed by different individuals, who thus acquire great skill and judgment in their peculiar occupations. The mode of payment adopted in tutwork and tribute is entirely different: in the former case, where the miner is employed in sinking shafts, driving levels, &c., the object being to extract as much useful labour as possible from him for a given sum, he is paid at so much per fathom, according to the work done; in the latter case, where the quality of the ore raised is a consideration equally important with its quantity, the miner receives a certain percentage on the actual value, being paid at the rate of so many shillings in the pound upon that value. The excellence of the above principle will readily be seen; and its advantages are still further increased by the open and public manner in which the contracts are made between the men and their employers, thus allowing of free competition as regards the former, and proving an equally effective check against oppression from the latter.

The usual period for making new arrangements with the men is at the end of every two months, when, all previous bargains having expired, both parties are again perfectly free to regulate their contracts. Previously, then, to this day, every part of the mine is visited and inspected by the underground agents, who afterwards consult together, and determine their plan of operations for the next two months, registering in detail the work to be performed, and what they consider as a fair price to be paid for each separate item. On the day appointed for the 'setting' or 'survey,' as it is termed, the men who usually work in the mine, together with others who may wish for employment there, assemble round the mine-office, upon a small covered platform, in front of which the agents, at the appointed time, make their appearance with a book in which their previous examination has been registered. Every piece of work to be performed in the mine is then called out in succession, and accurately defined, and the men make at the time a proposition for working it on certain terms. The price thus offered is, in the first place, usually more than would be fair, or than the men themselves expect to get; consequently, the moment a price has been named, another offer will be made somewhat lower, and so on till fair terms have been proposed, when the competition (except in rare cases) will cease, and the work or 'bargain' is considered as taken by the last and lowest bidder, whose name is immediately registered opposite to its description in the setting-book. As each piece of work will require the labour not of one individual but of many, the transaction is still further simplified by the bargain being taken and the contract made with one person only, each gang of men accustomed to work together always selecting one of their number to represent and act for them on these occasions. It is evidently desirable that there should be some plan for binding the men to their engagements, so that they should not be capriciously given up previous to the expiration of the term; and this is the more necessary, as, owing to the frequent fluctuations of richness or of hardness incident to the vein or to the rock in which they may be working, they may find themselves unable to realise the amount of wages which they had anticipated: sometimes indeed the change may be so great, that it is not worth their while to go on with it at all. To meet these contingencies there is in most large mines a printed set of regulations, to which all the miners working there must subscribe; and by which fines are established for the non-fulfilment of contracts, sufficiently heavy to prevent them from being given up while any fair probability exists of their being completed at any reasonable rate of remuneration. In this manner the exertions of the working miner are called into action, and prompted to surmount many of the minor obstacles and fluctuations which often baffle his calculations. Although it may appear harsh to exact a fine when a losing piece of work is given up, it must be remembered that, on the other hand, the vein will often improve in quality instead of deteriorating; and in that case the miner will be greatly benefited, as his labour will be employed upon rich ores at the same high rate of payment that was bargained for poorer ones; and from this favourable change he may benefit as much as the exertions of himself and his co-partners will allow, till the fixed time for the renewal of the contracts again comes round. The set of regulations before alluded to prescribe such other rules and fines as are found necessary for the proper management and conduct of the men; and by means of this simple code, the results of mutual and acknowledged interests, it is found in practice that the necessary discipline can be kept up over the large bodies of men employed in our most extensive mines.

Superintendence.—The mode of superintendence by which the foregoing system is kept in due check is very simple: the principle of self-interest which pervades the whole renders unnecessary much of that minute control which would otherwise be needed. The business of a mine naturally divides itself into several departments—the underground operations, the pit-work and machinery, the dressing and surface-work, accounts and financial matters, and lastly, the general control. For each of these departments proper agents or superintendents are appointed, all being subordinate to a general manager, who communicates and advises with the whole body of the shareholders or 'adventurers' at stated periods, or more commonly only with a select committee chosen by them, the whole body meeting but once a year. It may be observed that the agents of a mine are usually chosen from the most intelligent working-miners, who are peculiarly well qualified by their thorough practical knowledge both to form a sound judgment upon the state of the works, and to keep a check upon any frauds which might be attempted by the men, while this selection affords a powerful stimulus to good conduct among them, since it may be attended with such advancement. The general control of extensive mines is of course confided to men of superior education and ability, by whom scientific attainments are brought to the aid of the practical knowledge which superintends the inferior departments.

Education and Qualifications of Miners.—We may conclude this article by a few remarks on the education and qualifications of miners, and upon those institutions which have lately been established with a view to improvement in this respect. The business of the miner is essentially a practical one, and can only be acquired in the recesses of the mine, and amidst the busy operations carried on upon its surface. Though this obvious truth must be admitted to its full extent, it is impossible not to see that the results of science must, though unconsciously to the miner, be needed at every step. In the most costly, the most anxious, and at the same time the most precarious of all mining processes, the exploration of the ground for purposes of discovery and trial, geology may be made of the highest value: in understanding the nature and value of the heterogeneous mineral bodies presented to our view in underground works, chemistry and mineralogy are essential, and it is entirely upon the

former science that the whole art of metallurgy is established. Again, we have seen that machinery and mechanical contrivance are necessary at every step of the miner's progress, a circumstance which renders a knowledge of mechanics indispensable; and in pursuing the complicated operations of underground discovery, loss and error can only be avoided by the aid of geometry and subterranean surveying.

Thus then we may perceive that, in addition to practical knowledge in mining, there is a wide scope for the application of scientific knowledge also; in fact it is continually in requisition, not merely in the general arrangements, but in the details also, and ought therefore to be possessed, to a certain extent, by the mining classes. Among those nations of Europe by which mining is most successfully cultivated, the value and necessity of scientific knowledge among miners have long been perceived, and ample provisions have been made for its attainment, as may be seen in the mining-schools of France and Germany. Although Great Britain possesses the richest and most productive mines in the world, it is a singular fact that, till within the last two or three years, nothing has been done in this country to provide the means of instruction for those who are designed for the profession of mining. Thus both the working miner and the mine agent have, in this country, no knowledge whatever of the principles on which the success of their operations depends, but proceed entirely upon the practical skill which they may have been able to acquire in the course of their experience. It is true that, notwithstanding this disadvantage, the English miner has accomplished the most difficult undertakings, has conducted mines on the most extensive scale, and has met with most successful results; yet, when we consider the increasing depth of our mines, and the competition to which we are now exposed from foreign countries, it will be obvious that this defect should at length be removed, and that the English miner should add to his acknowledged and invaluable practical skill all the benefits and resources to be attained from scientific knowledge.

Mining Schools.—When treating of the history of mining at the beginning of this article, the establishment of several institutions for the attainment of those acquirements which are needed in the professions of civil engineering and mining was noticed as forming the most recent event connected with the subject, and in a few years' time the benefits thus derived will no doubt be strikingly apparent. The mining-school of Cornwall recently placed in operation by Sir Charles Lemon, will supply able miners well instructed in all that relates to the working of our tin, copper, and lead mines; while the university of Durham will produce mining engineers whose qualifications will have a more especial reference to the working of coal and other minerals which occur in the stratified rocks of the north of England. Thus by introducing a system of sound mining education, and by the continual progress of science, aided by the efforts which are now being made by government to supply desiderata which have long been required by the mining interest, we may hope still to maintain our mines in a flourishing condition, notwithstanding their depth, their heavy expenditure, and the increasing competition of other countries.

MINING, COAL. Although it would be impracticable to enter upon the various modifications of mining processes which are required in the working of all the varied natural depositaries of mineral wealth, the peculiarities of coal-mining are such as to require a brief notice, important and extensive as are the coal-mines of this country, and the arts and manufactures supported by them.

The nature and distribution of our carboniferous deposits have been already fully described in the article COAL-FIELDS. In working mines of coal, or indeed of ironstone or rock-salt, and other minerals which are found in beds, the object to be attained is the effectual opening and extraction of a tolerably uniform mass of small thickness, but of great horizontal extension. The process thus differs considerably from the working of mineral veins, where the object of research is fluctuating and irregular in its produce, and either vertical or highly inclined in its position. The thickness of beds of coal may be said generally to vary from three or four to eight or nine feet, although sometimes, when several seams come together without any intervening layers of rock, they may expand to twenty or thirty feet, of which we have an example in the 'ten-yard coal' of Staffordshire. In every coal-field there are many seams of coal at greater or less intervals, one below another, of which as many as three or four are frequently worked in the same mine; and interstratified with the rock which divides them there are in many coal-fields extremely productive beds of ironstone, which are wrought at the same time, and in a similar manner with the coal.

The mode of working coal-mines will be most clearly understood by tracing the works from their commencement, in the same manner as in the former article. From the geological indications of coal and the known extension of its beds over very considerable areas, it is pretty certain to be found in the trials which are made for it, if carried on with proper judgment. The probable existence of beds of coal in depth having been ascertained, and perhaps the beds themselves discovered by boring, the first process is to sink a perpendicular shaft from the surface so as to intersect the various strata containing the coal, and of course as many of the beds of coal as are considered to be worth working. The shaft is generally circular, and may vary according to circumstances from six or seven to eight or ten feet in diameter; the upper portion, as far down as the solid rock, is either bricked or walled, and where the ground is weak this casing may be continued throughout. On reaching the first workable seam of coal, the sinking of the pit is for a time suspended, and a broad straight passage termed a 'bord' or 'gate' is driven from it upon the seam of coal in opposite directions. The breadth of this passage is usually twelve or fourteen feet, and it is formed the whole height of the seam of coal, so as to expose the stratum above, which is called the 'roof,' and the one below, which is termed the 'thill,' and its direction is always arranged so as to follow the cleavage of the coal which forms its sides, which thus presents a clean uniform surface. When the bord or 'mother-gate' has proceeded some distance on both sides of the pit, narrow passages, termed 'headways,' are driven from it at regular intervals, and exactly at right angles; and when these have proceeded eight or ten yards, they are made to communicate with another bord, which is opened parallel to the first and on each side of it. It will be seen that by continuing this system of excavation the bed of coal will be entirely laid open and intersected by a series of broad parallel passages or bords about eight yards apart, communicating with each other by narrower passages or 'headways,' which cross them at right angles, and likewise traverse the whole extent of the mines; immense square or rectangular pillars of coal being left standing between the two. A coal-mine in this state is not in fact unlike a regularly-built town; the bords and headways may be compared to the principal streets and the narrower streets which cross them; while the pillars of coal may be said to resemble the intermediate masses of buildings.

The water encountered in the above operations is drawn to the surface by a powerful steam-engine erected on the shaft, which is so arranged as also to raise the coal and rubbish, for which purpose either 'corves' or baskets are commonly employed. Supposing the above operations to have been successful as regards the prospects of the mine, another shaft will now be commenced at some distance from the first, and when the communication between them has been effected, the one being made downcast and the other upcast, the air is conducted from the latter to the former through all the bords and workings, which it must traverse in succession in consequence of 'stoppings' or doors which are fixed in various places to obstruct its progress and give a proper direction to the current passing to the upcast shaft. Till such communication can be formed, the first shaft may be divided by a 'brattice' or partition, and be made to answer the purposes of both; some few coal-mines are indeed worked entirely in this manner, but the danger of explosion is considerable when the workings become extensive.

While the workings on the first seam of coal are thus going on, the shaft may be sunk to a second or third seam, where similar operations will be commenced, small underground pits or 'staples' being sunk at intervals from the workings on the upper seam to those on the seam below, by which ventilation will be promoted. These operations, like those described in the former article, may be carried on indefinitely, and will thus in time form an extensive colliery. The regularity and uniformity of the workings however are greatly modified by the occurrence of faults and other local accidents, and the pillars themselves are finally removed to such an extent as to cause subsidences of the roof and undulations of the floor, which present a most frightful appearance to the stranger.

The mode in which the pitman carries his excavation upon the coal is by cutting a narrow fissure in the seam on each side of the bord, and undermining the coal between, finally detaching the great cubical mass thus circumscribed by putting in two or three shots, which are simultaneously fired at the top of the seam. From 60 to 80 or 100 tons of coal may thus be brought down at once, when it is put into corves drawn along a tram-road to the shaft, and thence raised by a steam-engine to the surface, where it is often passed over gratings or 'screens' in order to separate the small pulverized coal from the larger masses, which in coal countries are alone valuable.

In mines which are not endangered by explosive gases or 'fire damp,' the coal-miner or 'pitman' is guided in his operations by the usual subterranean light—a small candle stuck into a piece of moist clay; but where the fire-damp is apprehended the safety-lamp is used, which has long superseded the primitive contrivance of the steel-mill, the light of which was produced by the contact of a flint with the edge of a wheel kept in rapid motion. Notwithstanding the use of the Davy lamp, and the improvements which have taken place in ventilation, accidents from explosion are unfortunately still of frequent occurrence, although perhaps in most cases they may be traceable to some neglect or imprudence on the part of the men themselves.

MI'NIUM. [LEAD, vol. xiii., p. 370.]

MINK, a name for the Vison-weasel, *Mustela* (*Putorius*) *Vison*. [WEASELS.]

MINNISINGERS. [GERMANY—*Language and Literature*.]

MINNOW. [LEUCISCUS.]

MINOR, (Latin) *Less*, or *Lesser*, is a term used to distinguish the mode or key that takes a minor 3rd. It is also applied to all the diatonic intervals, but chiefly to the 3rd. The minor 3rd comprises a tone and a semitone—A, C: the major 3rd is composed of two whole tones—C, E. [KEY; MODE.]

MINORCA. [MENORCA.]

MINOS, in history, appears as the lawgiver of Crete. Those critics who consider all the personages of mythological history as little more than names to which is attached the history of social development, would view Minos simply as the concentration of that spirit of order which about his time began to exhibit in the island of Crete the forms of a regular polity. But we are not to consider, because there is much undoubtedly mythological about the history of Minos, that therefore he never existed. The concurrent testimony of Thucydides and Aristotle shows it to have been the general belief in their times, that Minos was the first among the Greeks who possessed any amount of naval power. According to the latter author, he conquered and colonised several islands, and at last perished in an expedition against Sicily.

In the second book of the 'Politics,' Aristotle draws a parallel between the Cretan and Spartan institutions, and he there ascribes the establishment of the Cretan laws to Minos. This comparison, aided probably by the connection which existed between Crete and Sparta, owing to colonies, as early as the time of Homer, has no doubt suggested the theory invented and supported by Müller, that Minos was a Doric prince; a theory, as Mr. Thirlwall asserts, utterly unknown to the antients. The subject is ably discussed in the *History of Greece*, i. 135.

Some post-Homeric authorities make Minos a judge in Hades in company with Æacus, Rhadamanthus being chief judge. In this character he appears in a short Platonic dialogue called 'Minos,' or 'on law,' which however some critics consider spurious.

Minos is a son of Jupiter; this being the usual method taken by the mythographers to express a person so antient that they could put him on a level with no more mortal; and from Jupiter, as his father, he learns those laws which he afterwards delivers to men.

Minos is chiefly remarkable as belonging to a period when history and mythology interlace, and as uniting in his own person the chief characteristics of both. He is a son of Jupiter and yet the first possessor of a navy; a judge in Hades, but not the less for that a king of Crete. It is very curious, that Crete, so famous at this age, both for its naval power and for being the birth-place of the Olympian gods, should never afterwards have attained anything like that celebrity which its position seemed to promise. Its office seems to have been that of leading the way in naval supremacy. Too insulated for power of a durable nature, it was lost in the confederate or opposing glories of Athens and Sparta; but while they were yet in their infancy, its insular form (together perhaps with some Asiatic refinement) gave it that concentrated energy which in an early age is irresistible.

(Homer, *Il.*, ii. 65; xiii. 450; xiv. 321; *Odyssey*, xix. 175; Thucydides, i., c. 3; Plato, *Laws*, b. i. and ii., and 'Minos;' Aristotle, *Politic*, b. ii. and vii; *Philological Museum*, 'On the Names of some of the Ante-Hellenic Inhabitants of Greece.')

MINOTAUR, son of Pasiphaë, wife of Minos, by a bull. He lived on man's flesh, for which reason Minos put him in the labyrinth of Dædalus, feeding him with criminals, and afterwards with the youths and maidens sent from Athens. Theseus, by help of Ariadne, killed him, thereby delivering the Athenians from the obligation of sending their children to be eaten. Such is the mythological story. Its meaning is uncertain. It very likely belongs to that class of mythological tales which express a political fact, and the connection in which Theseus stands with the Minotaur adds probability to this theory, for the exploits of Theseus are generally such effects as would be produced in historical times by the course of events in the formation of a polity. Such at least are his exploits in and about Attica, and there appears no sound reason to exclude this from the number. It may then perhaps be assumed that under the slaying of the Minotaur is shadowed forth the abolition of certain obstacles existing in the way of free intercourse between Athens and Crete. But the descent of the Minotaur from Pasiphaë (Πασιφάη), probably a name of the moon, and the Bull, one of the zodiacal signs, may perhaps imply some astronomical fact connected with the recurrence of the tribute paid to Crete. The affection of Ariadne for Theseus, in mythological language, may be taken to mean a union of Cretan and Attic tribes. It should be observed that Schwenk, in a very fanciful but ingenious treatise on mythology, considers the first two syllables of the word Minotaur to be identical with *meis* or 'mēn' (μείς or μὴν μηνός), the German *mond*, and the English *moon*, so that we get the two parents of the Minotaur in the two parts of its name. This might lead us to believe that the name suggested the genealogy, and that the last syllable referred not to a bull's being the father of the Minotaur, but to the fact that horns were a symbol of the moon-goddess, which may be either Hera, Juno (as Io), or Artemis. In that case, as the slaying of Marsyas by Apollo undoubtedly means the replacing of a worship of which Marsyas was the type, by that of Apollo and Artemis; so the slaying of the Minotaur by Theseus might mean the introduction of the Attic worship, in place of the previously prevalent Dorian form. (Hoeck, *Kreta;* Schwenk, *Mythologische Andeutungen*, p. 65.)

MINSK, a government of European Russia, in the division called West Russia (formerly Lithuania), lies between 51° 12′ and 55° 50′ N. lat. and 25° 18′ and 30° 50′ E. long. It is bounded on the north by Witepsk, on the east by Mohilew, on the south-east by Tschernigow, on the south by Kiew and Wolhynia, on the west by Grodno, and on the north-west by Wilna. Its area is about 37,000 square miles, and the population 1,205,000. This government is divided into ten circles. The face of the country is one vast plain, broken only here and there by a hill or the high banks of the rivers. In the north and east there are large forests, and on the south and south-west extensive marshes. There is a great diversity of soil; in the north it is dry, and in some parts extremely fertile, but traversed by heaths and barren sandy tracts. In the south it is generally wet and marshy, yet it contains large tracts which are very fertile; the marshes also are rendered productive with little labour, and even the heaths yield to the efforts of cultivation.

The principal rivers are the Düna and the Dnieper, both of which however only touch the frontier; the former flows for a short space between this province and Wilna, and the latter on the south-east divides it from Tschernigow. Among the rivers that flow into the Düna are the Desna, which comes from Wilna, and joins it at the town of the same name, and the Ulla, which feeds the Beresina canal, which unites the Beresina, the Düna, and the Dnieper. The Dnieper receives from this province two of its most important tributaries, the Pripez, which comes from Grodno, and the Beresina, which rises in the circle of Desna, and having received several minor streams falls into the Dnieper

on the frontier of this province. In the fatal retreat of the French army from Russia in 1812, it sustained great loss on the banks of this river. There are many other rivers of less note. The province has no great lakes.

The climate is not very different from that of White Russia. The cold in winter is so severe that the rivers are every year frozen over for some time; in spring there are frequently hard frosts at night; the summer is hot, and drier in the north than in the south; in autumn the weather is agreeable and not variable, but the night frosts return in September, and winter begins at the end of October. On the whole the climate is healthy, but more so in the north than in the south. The plica Polonica is more common than in Lithuania and White Russia.

Agriculture is the chief occupation of the inhabitants, and might raise them to a considerable degree of prosperity if they applied themselves properly to it; but Minsk is one of the most backward of all the provinces in the empire with respect to its agriculture. The fields are ill cultivated, the agricultural implements wretched, and the cattle miserable. The circles of Pinsk and Mozyr are real deserts. The grain generally cultivated is rye, but the peasants grow also some barley and oats, and the nobles and great landowners grow some wheat. Buckwheat is grown on the heaths. The only other agricultural products are flax and hemp, both of excellent quality, which furnish linseed and tow for exportation. Kitchen vegetables and fruit are very little cultivated, except in the gardens of the nobles. There are extensive forests of fine trees, especially fir, which supplies good timber for building, planks, and masts, and yields likewise much resin, pitch, and potash. All kinds of game abound in the forests, which contain deer, wolves, bears, lynxes, foxes, beavers, otters, gluttons, ermines, martens, and wild boars. The horses are of the Polish breed, and are very spirited and hardy, but neither handsome nor large. Some of the nobles have studs of a superior breed. The urus, wild bull, or buffalo (the *aurochs*), is sometimes met with in the deepest recesses of the forests. The breed of cattle in the neighbourhood of the towns and on the estates of the nobility is better attended to than agriculture. Sheep are numerous in the northern part, and the great landowners have much improved the breed. The peasants have only sheep of the ordinary breed, and in the south very few, because the food in the marshes does not agree with the sheep. Goats, swine, and bees are kept everywhere. Though the rivers are so numerous, and many of them abound in fish, they do not supply sufficient for the consumption of the province, and great quantities of fish are brought from the interior of Russia and from the Baltic. Polish cochineal is collected, especially in the south, in great quantities, and manna is found in all the fields and meadows. The minerals are lime, marl, and stone for building, but there is no metal except bog-iron.

The domestic industry of the country-people consists in spinning and weaving flax, hemp, and wool, of which they make linen, sail-cloth, and coarse woollen cloth for the peasantry, but their dwellings are so small that they have scarcely room for a loom. They distil brandy enough for their own consumption. The manufactories are very few in number, and inconsiderable. The chief articles of exportation are square timber for ship-building, masts, spars, planks, pipe-staves, and potash; besides flax, hemp, linseed, corn, honey, wax, cochineal, and cattle. The inhabitants are of various races:—1, Little Russians (or Russniaks), who are the great majority, and speak a dialect composed of Russian and Polish. 2, Lithuanians, in the northern circles, who have their own dialect. 3, Poles, consisting only of petty nobles, above 26,000, and a few citizens, with a dialect of their own. 4, Tartars, probably near 50,000, who speak their own language, and remain faithful to Islamism. 5, Armenians and Greeks in the towns. 6, Great Russians and German colonists, in small numbers. 7, Jews, fewer in proportion than in the rest of Poland. 8, Some families of gypsies. The greater part of the inhabitants are of the Greek church; but the Catholics are very numerous; and there are some Protestants. The Tartars have their mosques, and the Jews synagogues. This is one of the most miserable of the former Polish provinces; the towns and villages are in general wretched, chiefly occupied by Jews, who are almost exclusively the shopkeepers, publicans, distillers, and even butchers. The petty nobility are scarcely above the peasants, of whom only the Tartars are reckoned free, while the Russniaks, Lithuanians, and gypsies are in the most degraded state of vassalage, which is greatly aggravated by the non-residence of the great landowners.

MINSK, the chief town, in 53° 40′ N. lat. and 27° 40′ E. long., is situated on the river Swistocz, one of the tributaries of the Beresina. Like all old Polish towns it is irregularly built, with narrow crooked streets. It has a fine cathedral, a handsome theatre, a gymnasium, an abbey of the Greek church, and is the seat of a Greek archbishop, a Roman Catholic bishop, as well as of the government of the province. There is some trade, and a much frequented fair. With regard to the number of inhabitants, a great increase would seem to have taken place in a few years, for it is stated by Stein, in 1820, at 1900; by Hassel, 1820, at 3000; but by Cannabich, 1836, Hörschelmann, 1833, and others of equally recent dates, at 20,000.

The other principal towns are, Bonrissow, on the Beresina, with 3000 inhabitants; Sluzk, with 5000 inhabitants; Daurdow, on the Horyn, with 3500 inhabitants: Neschwitsch, on the Uscha, with 3500 inhabitants; and Pinsk, which is surrounded with immense marshes, and has considerable manufactories of Russia leather, with 4500 inhabitants. Bobruisk, on the Beresina, now one of the strongest fortresses in the Russian empire, has 4700 inhabitants.

MINSTREL, from the French *menestral*, and that, in all probability, from *Ministrellus*, a diminutive of the Latin *minister*, as a term applied to a class of persons who were to administer by their skill to the amusement of their patrons. 'The minstrels,' observes Percy, 'were an order of men in the middle ages who subsisted by the arts of poetry and music, and sang to the harp verses composed by themselves or others.' They also appear to have accompanied their songs with mimicry and action, and to have practised such various means of diverting as were much admired in those rude times, and supplied the want of more refined entertainment. These arts rendered them extremely popular and acceptable in England and all the neighbouring countries, where no high scene of festivity was considered complete that was not set off with the exercise of their talents; and where, so long as the spirit of chivalry subsisted, they were protected and caressed, because their songs tended to do honour to the ruling passion of the times and to encourage a martial spirit.

The minstrels seem to have been the genuine successors of the antient bards, who, under different names, were admired and revered, from the earliest ages, among the people of Gaul, Britain, Ireland, and the north, and indeed by almost all the first inhabitants of Europe, whether of Celtic or of Gothic race; but by none more than by our own Teutonic ancestors, particularly by the Danish tribes. Among these they were distinguished by the name of Scalds, a word which denotes 'smoothers and polishers of language.' In short, poets and their art were held among them in that rude admiration which is ever shown by an ignorant people to such as excel them in intellectual accomplishment.

As these honours were paid to poetry and song, from the earliest times, in those countries which our Anglo-Saxon ancestors inhabited before their removal into Britain, Bishop Percy reasonably concludes that they would not lay aside all their regard for men of this sort immediately on quitting their German forests; at least so long as they retained their antient manners and opinions they would still hold them in high estimation. But as the Saxons, soon after their establishment in this island, were converted to Christianity, in proportion as literature prevailed among them, this rude admiration would begin to abate, and poetry would be no longer a peculiar profession. Thus the poet and the minstrel early became two persons in this island. Poetry was cultivated by men of letters indiscriminately; and many of the most popular rhymes were composed amidst the leisure and retirement of monasteries. But the minstrels continued a distinct order of men for many ages after the Conquest, and got their livelihood by singing verses to the harp at the houses of the great.

This derivation of the minstrels from the Scalds and Gleemen of the north rests on fair historical testimony; and the reader will not fail to call to mind the incidents recorded of several Saxon and Danish princes, who assumed the disguise of Gleemen, and chanted to the harp when exploring a hostile camp.

The name of minstrel is however Norman. 'It is well known,' says Percy, 'that on the Continent, whence our Norman nobles came, the bard who composed, the harper

who played and sang, and even the dancer and mimic, were all considered as of one community, and were even all included under the common name of minstrels:' hence we may add their Latin names of *Mimi*, *Scurræ*, *Histriones*, *Joculatores*, &c.

Joculator Regis is an officer holding no less than three vills in the return of the Domesday Survey for Gloucestershire; and in the same survey, in Surrey, we have a *Joculatrix*. Wace, Gaimar, and our own historians William of Malmesbury and Huntingdon, all concur in the statement that a warrior-minstrel of the name of Taillefer rode before the conqueror's army previous to the battle of Hastings, flinging up and catching his sword in defiance, and singing the song of Roland.

To trace the existence of the minstrel profession minutely through the reigns immediately subsequent to the Conquest seems unnecessary. Rahere, the founder of St. Bartholomew's Priory in Smithfield, is recorded as the '*mimus Regis Henrici I.*;' nor can we forget the cruel punishment inflicted on Lucas de Barre by that king, for exercising the minstrel art to his disadvantage.

If king Henry II. was not an encourager of minstrels, his son Richard was himself of their number. The story of Blondel de Nesle, who went in search of Richard in his captivity, needs hardly to be repeated here. It is not so apocryphal as many have supposed. He came to a castle in which he heard that a person of importance was confined; his privileged character gave him a near access to the fortress, and he began a song which he and Richard had composed together. When Richard heard the song, he knew it was Blondel that sang it; and when Blondel paused at the end of the first stanza, the king began the other, and completed the song.

The minstrels, it appears, were no less patronised by Richard than by the favourites and chief officers of his court. Tyrwhit, in his 'Essay on the Language and Versification of Chaucer' (*Cant. Tales*, 4to. ed., vol. i., p. 39), shows from Hoveden that William bishop of Ely, Richard's chancellor, is expressly mentioned to have invited singers and minstrels from France, whom he loaded with rewards; and they, in return, celebrated him as the most accomplished person in the world.

Walter de Hemingford relates an anecdote of the fidelity of a minstrel who, in 1272, rushed into the tent of Edward I., at that time only prince, while on his expedition to the Holy Land, to rescue his master from a Saracen assassin.

In Rymer's 'Fœdera' (old ed., tom. iii., p. 978) we find king Edward II., in the sixteenth year of his reign, rewarding his minstrel William de Morle, called 'Roi de North,' with certain houses in the vill of Pontefract, which had lately belonged to John de Boteler, called 'Roi Brunard' (probably another minstrel), the king's enemy.

The instances of regard shown to minstrels in subsequent reigns are abundantly numerous. When Henry V. was preparing his great voyage to France in 1415, eighteen minstrels accompanied him, with an allowance of 12*d.* a day each (Rym., *Fœd.*, tom. ix., pp. 255, 260); and in the 34th Henry VI., A.D. 1456, an ordinance occurs for the impressment of youths to supply vacancies by death among the king's minstrels, 'ad quosdam pueros, membris naturalibus elegantes, in arte ministrellatus instructos, ubicunque inveniri poterint, tam infra libertates quam extra capiendum, et in servitio nostro ad vadia nostra ponendum.' (*Ibid.*, tom. xi., p. 375.)

Warton, in his 'History of English Poetry,' vol. ii., p. 105, has cited several instances of the high pay to minstrels at this period:—'During many of the years of the reign of Henry VI.,' he says, 'particularly in the year 1430, at the annual feast of the fraternity of the Holy Cross at Abingdon, a town in Berkshire, twelve priests each received fourpence for singing a dirge; and the same number of minstrels were rewarded each with two shillings and fourpence, beside diet and horse-meat. Some of these minstrels came only from Maydenhithe or Maidenhead, a town at no great distance, in the same county. In the year 1441 eight priests were hired from Coventry, to assist in celebrating a yearly obit in the church of the neighbouring priory of Maxtoke; as were six minstrels called *mimi*, belonging to the family of Lord Clinton, who lived in the adjoining castle of Maxstoke, to sing, harp, and play in the hall of the monastery, during the extraordinary refection allowed to the monks on that anniversary. Two shillings were given to the priests, and four to the minstrels; and the latter are said to have supped *in camera picta*, or the painted chamber of the convent, with the sub-prior; on which occasion the chamberlain furnished eight massy tapers of wax.'

In the reign of Edward IV. a sergeant of the king's minstrels occurs, and in a manner which shows the confidential character of this officer, and his facility of access to the king at all hours and on all occasions. Hearne has printed the passage relating to him in a fragment concerning the ninth year of Edward IV. at the end of Sprott's 'Chronicle':—'And as he' (the king) 'was in the north contray, in the moneth of Septembre, as he lay in his bedde, one namid Alexander Carlisle, that was *sarjaunt of the mynstrallis*, came to him in grete haste, and bade him aryse, for he hadde enemys comming.'

From this period however the real character of the original minstrel was becoming rapidly extinguished, and even the name seems to have been gradually appropriated to the musician only. At queen Elizabeth's magnificent entertainment by Leicester, at Kenilworth Castle, in 1575, it is true a personage was introduced to amuse the queen, in the attire of an antient minstrel, who called himself 'a squire minstrel of Middlesex;' but this was, no doubt, a part of the masquerade: it was the representation of a former day, not one of an existing profession. Laneham ('Princely Pleasures of Kenilworth,' Nichols's *Progresses of Queen Eliz.*, vol. i.) says:—'After three lowlie coursiez he cleered his vois with a hem and a reach, and spat out withal; wiped hiz lips with the hollo of his hand, for fyling his napkin, temper'd a string or too with hiz wreast, and, after a little warbling on his harp for a prelude, came foorth with a sollem song, warranted for stoory oout of king Arthurz acts.'

Before Elizabeth closed her reign the degradation of minstrelsy was completed. By a statute in her 39th year minstrels, together with jugglers, bear-wards, fencers, common players of interludes, tinkers, and pedlars, were at one sweep included among rogues, vagabonds, and sturdy beggars, and adjudged to be punished accordingly. Ritson quotes some satirical lines in allusion to this statute, written by a Dr. Bull:—

'When Jesus went to Jairus' house,
Whose daughter was about to dye,
He turn'd the minstrels out of doors,
Among the rascal company:
Beggars they are with one consent,
And rogues by act of parliament.'

This act put an end to the genuine old minstrelsy as a profession; and the modern definition of minstrel is no more than 'a musician, a player upon some instrument.'

MINT, the place where money is coined, from the Anglo-Saxon mynet, and that in all probability adopted from the Latin *moneta*.

Of the manner in which the Britons conducted the coinage of their rude substitutes for money no notices can now be recovered. Few regulations indeed would be required where an equality of weight appears, from Cæsar's account, to have been the sole object in view.

If the Romans actually coined money in Britain, of which, we presume, there can be no doubt, their mints were probably superintended by the same officers as were employed in other parts of their dominions; but no documents have yet been produced in proof of it: nor is anything known respecting the mints of the British kings after the departure of the Romans.

On the early Anglo-Saxon coins are found, in addition to the names of the kings, those of other persons also upon the same piece, who are with great probability conjectured to have been the moneyers, because on later Anglo-Saxon money the names of those officers frequently occur, with the addition of their title of office. From the circumstance of their names being inscribed on the coins, it is reasonable to conclude that they were responsible for the integrity of the money; and likewise that they were the principal officers of the mint. The silence also of the Anglo-Saxon laws and of Domesday Book as to other officers of the mint, whilst they so frequently mention the moneyers, strongly corroborates the opinion that they were the only persons employed in the Anglo-Saxon and early Anglo-Norman mints, except perhaps occasional labourers. In the reign of Henry I. the money was so much debased as to call for exemplary punishment on the offenders, which is said to have been inflicted on moneyers only, without the least notice of any other officer. (*Sax. Chron.*, sub An. 1125.) This was also

the case upon a similar occasion in the reign of Henry II. (*Chron. Joh. abb. S. Petri de Burgo*, Sparke, p. 78.)

In the Anglo-Saxon times an officer called the reeve seems also to have had some kind of connection with the mint, or some jurisdiction over it; for in the laws of Canute it is provided, that if any person accused of false coinage should plead that he did it by licence from the reeve, that officer should clear himself by the triple ordeal. If he failed to do this, he was to suffer the same punishment as the falsifier himself, which, in the same chapter of the law, is said to be the loss of that hand by which the crime was committed, without any redemption either by gold or silver. (*Leg. Anglo-Saxon.*, p. 134; *Ll. Cnuti*, § 8.)

After the Norman conquest the officers of the mint appear to have been, in some degree, under the authority of the court of Exchequer, as they were admitted to their respective offices in that court, and took the usual oath of office before the treasurer and barons.

Ruding observes that if the gerefa, or reeve, above mentioned was not the presiding officer of the Anglo-Saxon mints, he is unable to ascertain at what period it became necessary to place some permanent superintending authority in the mint to prevent any ill-practices of the moneyers; but he thinks it probable that such an officer was appointed between the 26 Henry II., when the moneyers alone were punished for the adulteration of the money, and the third year of Richard I., when Henry de Cornhill accounted for the profits of the cambium of all England, except Winchester. (Madox, *Hist. Excheq.*, vol. ii., p. 132.)

The mint however did not attain its full constitution of superior officers until the 18 Edward II., when a comptroller first appeared and delivered in his account, distinct from those of the warden and master, whose accounts also were distinct from each other. Thus they operated as mutual checks, and no fraud could be practised without the concurrence of all those three persons.

One of the principal offices, namely, that of cuneator, and probably others, descended by inheritance even in the female line, and the inheritor was sometimes allowed to sell it. See Ruding's account of this office in his 'Annals of the Coinage of Britain,' 8vo. edit., vol. i., pp. 109-114, where its descent is traced from the time of Domesday Book to the 4 Richard II.

In the Anglo-Saxon and the early Norman period there were many mints beside the king's, and some were continued to a much later time. Barons and bishops struck money, especially in King Stephen's reign, and in two or three instances the privilege of coining was granted to greater monasteries. Wolsey's exercise of this franchise, both as bishop of Durham and archbishop of York, is well known: and there are coins of the archbishops of Canterbury, distinctly marked as such, at intervals from Jaenberht, consecrated in 793, to the close of the reign of Henry VIII. Of the lay barons of Stephen's time, we have but one coin now extant, usually ascribed to Robert earl of Gloucester. Pegge's Dissertation on the Coins of the archbishops of Canterbury, Noble's on those of the bishops of Durham, and more particularly Ruding's enumeration of the places where Mints and Exchanges have been fixed in Britain and its dependencies, will supply the reader with the amplest information upon this subject.

From a very early time the moneyers seem to have enjoyed exclusive privileges. In the 33 Henry II. the moneyers of York were expressly exempted from the payment of the 'Donum' which was assessed upon the men of that city. (Madox, vol. i., p. 635.) In the 18 Henry III. the mayor, &c. of London were commanded not to infringe upon the liberties of the king's moneyers of London, by exacting from them tallages or other customs contrary to their privileges (Cl. 18 Henry III., m. 30); and before his 41st year those privileges appear to have been extended to the whole body of officers belonging to the mint; for at that time the bailiffs, &c. of Canterbury were ordered to appear in the Exchequer to receive judgment for having distrained upon the officers of that mint. (Madox, *Hist. Exch.*, vol. i., p. 748; Ruding, *Annals*, vol. iv., p. 273.)

The earliest grant of these privileges by charter was in the reign of Edward I., when the officers of the exchange and of the mint were (by the names of the keepers of the changes of the city of London and Canterbury, the labourers, or workers, money-makers, or coiners, and other ministers deputed or appointed unto those things which touch the office of the changes aforesaid) freed from all tallages, and were not to be put into any assizes, juries, or recognizance, and were to plead before the said keepers of the changes only, except in pleas appertaining unto freehold and the crown.

These privileges were granted to them so long as they should continue in the above-mentioned offices, and were confirmed by Edward II. in his second year, with this addition, that they were to be quit of all manner of aids and contributions, as well as tallages, and that if at any time they should, of their own proper will, grant any aid or contribution, such should be levied upon them by the keepers of the exchanges aforesaid, and that no other should intermeddle. The keepers themselves were in such case to be taxed by the barons of the Exchequer. Letters-patent to the same effect were issued by Edward III., Richard II., Edward IV., Henry VII., Henry VIII., Edward VI., and Philip and Mary.* All these are referred to in the charter of incorporation which was granted by Elizabeth in the first year of her reign, but those of Edward I. and Edward II. alone are given at length.

In that year Queen Elizabeth, at the humble suit of the keeper of the changes, the labourers, coiners, and ministers deputed or appointed to those things which touch the offices of the change, and in consideration of certain general words in the former grants which had occasioned them and their predecessors to be molested, inquieted, and vexed, and because they should be able more especially to apply themselves to the business of their office, was graciously pleased to grant and confirm to them the letters-patent and grants aforesaid; and to remove all the doubts and ambiguities to which the former grants were supposed to be liable, incorporated them by the name of the keeper of the changes, and the workmen, coiners, and other ministers deputed to the said office; to be, from thenceforth one body perpetual and one commonalty perpetual, in deed and in name, and to have perpetual succession; to be of capacity in law to purchase lands, &c. by that name, and to hold to them and their successors for ever; to implead and to be impleaded; to answer and to be answered in all pleas, &c. in any court, and to have a common seal.

By this charter all the officers had privilege of not being put, against their will, in any assizes, juries, inquisitions, attaints, grand assizes, or recognizance whatsoever, even although they touched the crown. The workmen, coiners, and ministers were to stand right before the keeper of all manner of pleas, suits, actions, and plaints, touching themselves, pleas to freehold and specially pertaining to the crown excepted. None of the officers was to be made mayor, bailiff, collector, searcher, or assessor of the tenths, fifteenths, subsidies, tallages, or other impositions to be granted, or any part of them, or any other officer or minister of the crown, against his will. And all of them were to be quit and exonerate for ever, in the city of London, town of Calais, and all other cities and towns, from all and singular assizes, lones of and for wine, ale, beer, and all victuals whatsoever, to be made, and from all tallages, aids, gifts, contributions, fifteenths, tenths, scots, subsidies, and all other impositions to the queen, or to her progenitors late kings of England, granted or to be granted; and none of them to be distrained or molested in their lands, &c. for any of the premises, but to have due allowance and discharge of such tallages, &c. before the treasurer and barons of the Exchequer for ever; and no corn, hay, pigs, carts, oxen, poultry, or other merchandise, things, goods, victuals, and chattels of whatsoever kind, to be taken from them by any purveyor of the queen, or her heirs, any statute to the contrary notwithstanding. This charter bore date at Westminster on the 20th February, and there were subsequent confirmations of it in the second, third, fourth, and fifth years of her reign.

Ruding has cited various instances in which these privileges were intrenched upon: they were nevertheless confirmed by King James I. in the second year of his reign; by King Charles II. in his fourteenth year; and by the indenture which was in force in the year 1744, and which established the officers in their houses, places, &c., and in their charters and privileges.

These privileges they continue to enjoy to the present time. (Ruding, vol. i., p. 47.)

The following is the establishment of which the Mint at present consists:—

* There were also confirmations in the 1 Henry IV., Pat., p. 5, m. 25; 1 Henry V., Pat., m. 28; 5 Henry VI., Pat., p. 1, m. 17; 18 Henry VI., Pat., p. 3, m. 25; 23 Henry VI., Mich. Commun, rot. 17; Madox's MSS., No. 69, p. 94.

1. A Master and Worker, who is one of the queen's ministers.
2. The principal officers, forming a Board, viz.:—
   The Deputy Master,
   Comptroller,
   King's Assay Master,
   King's Clerk, and the
   Superintendent of Machinery and Dies.
3. Officers in the service, viz.:—
   The Master Assayer,
   Probationer Assayer,
   Weigher and Teller,
   Surveyor of Meltings,
   Surveyor of Money-Presses,
   Chief Engraver,
   Second Engraver,
   Medallist, and
   Clerk Assistant and Deputy Master.

Besides these there are four clerks in the Mint-office, two porters, and two or three other inferior persons.

The Company of Moneyers receive a rate on the coinage, conditionally 40*l.* to each member when the coinage is under 500,000*l.*

Ruding has given some slight notices as to the wages of the officers of the mint from the records of early times. In the 35 Henry III. the warden's salary was two shillings a day. In the 33 Edward I. the porter of the mint and exchange received ninepence a-day, and the same in the 9 Edward II. and 23 Edward III. The warden's salary in the 23rd Edw. III. was, as before, two shillings a-day, at which time his clerk received ninepence and the keeper of the dies sixpence a-day. In the 25 and 31 Henry VI. it was two shillings and sixpence. In Henry VI.'s 32nd year the engraver had twenty pounds per annum. The person who held the offices of comptroller, exchanger, and assayer, in the 1 Edward IV., was to take the usual daily wages, amounting to 26*l.* 13*s.* 4*d.* per annum. In the second year of the same king the engravers' wages were, as before, twenty pounds per annum, and in his sixth year the salary of the warden's clerk was ninepence a-day. In the 10 Edward III. the workmen of the mint of London petitioned the king for an increase of their allowance for coinage, alleging that they were at that time at greater expense, and bestowed more labour in forming the moneys than had been usual in former times; so that they could not maintain and continue such expense and labour, unless their allowance was increased. The king, being willing to grant their petition, if just, commanded John de Wyndesore, warden of the mints of London and Canterbury, together with Lapine Rogers and others experienced in such matters, to inquire whether the allowance was sufficient, and if not, to determine what addition should be made; and they were ordered to make their report in Chancery, under their seals, without delay. A warrant was in consequence issued, and Lapine Rogers and Roger Pikeman, exchangers of London, and Stephen Boke, having been examined upon oath by the warden, the following report was made:—That, having inquired diligently respecting the necessary expenses occasioned by the waste arising from the whitening of the halfpennies and farthings, on account of the increase of the alloy, and from the hardening of the metal of the said coins in working and coining, they were of opinion that the work could not be carried on without an increase of threepence for each pound, at least, and with that the workmen ought reasonably to be contented. Then, whereas of old they received for all costs, colour, &c., for a pound of halfpennies sevenpence-halfpenny, and for a pound of farthings ninepence-halfpenny, they would receive for the former tenpence-halfpenny, and for the latter twelvepence-halfpenny: so that the master should have of increase twopence, and the workmen one penny.

Ruding (vol. i., p. 51-58) has given the tables of fees and wages for the several officers in the years 1584, 1599, 1649, 1689, 1739, 1743, and 1797.

A comparative statement of the salaries and allowances, contingent expenses, and rates of coinage, between the establishments of the French and English mints in 1836 will be found, p. 87-89 of the Appendix to the 'Report from the Select Committee of the House of Commons on the Royal Mint,' ordered to be printed 30th June, 1837.

In antient times extraordinary methods were resorted to in order to furnish the mint with workmen. Thus in the 31st Henry III., a writ was issued, authorising Reyner de Brussell to bring into England, from beyond the seas, persons skilled in the coinage and exchange of silver, to work in the kingdom at the King's charge. (Pat., 31 Hen. III., m. 3.) And in the 25th Edw. III., Henry de Brussell and John de Cicestra, masters of the mint, were appointed by letters-patent to choose and take as many goldsmiths, smiths, and other workmen in the city of London and other places, where it might seem expedient to them, as should be necessary for the works of the mint in the Tower of London; and to bring the said workmen to the said Tower, and to place them there to work at the wages allowed by the said masters. And any of them which should be rebellious in that case, to seize and arrest, and to detain in prison within the said Tower, and to keep in safe custody until the king should determine upon their punishment. These letters were directed to all sheriffs, &c., who were commanded to assist the said masters in carrying their provisions into execution. (Pat., 25 Edward III., p. 2, m. 13 dors.)

This power to take workmen, &c., for the service of the mint was not discontinued in the reign of Elizabeth. (*Indent. with Lorison*, 14 Elizabeth, in *Harl. MSS.*, Brit. Mus., 698.)

The custom of placing the moneyer's name upon the coins prevailed, as already observed, at a very early period in this island; indeed we find it upon the money of Ecghberht, king of Kent, which is the second in point of antiquity in the Anglo-Saxon series, and must be dated about the middle of the seventh century. It was usually stamped upon the reverse of the coin, but in some few instances it is found upon the obverse, whilst the name of the monarch is removed to the other side. The names of two moneyers sometimes occur upon the same coin. From the time of Aethelstan, with some few exceptions only, the name of the town was added, probably in conformity to his law that the money should be coined within some town. (Wilkins, *Leg. Anglo-Sax.*, p. 319.) The name of the moneyer is not found lower than the reign of Edward I., but that of the mint was not entirely disused in the last year of Queen Elizabeth.

Metal brought to the mint was assayed, reduced to standard, and then formed into money, by the instruments which at different periods have been invented for that purpose.

The mode of coinage in early times, at least in this country, as far as it can now be traced, was rude and inartificial; the sole expedient employed being to fix one die firmly in a wooden block, and to hold the other in the hand as a puncheon; when, by striking the latter forcibly, and repeatedly, with a hammer, the impression required was at length worked up.

This method appears to have been nearly coeval with the first invention of coined money; and it is a singular fact that no improvement of any importance was made in it, until the power of the screw was applied to coinage in the French mint about the middle of the sixteenth century. (Le Blanc, *Traité Hist. de Monnoyes de France*, p. 268.)

The new invention was not however admitted into our mint before the year 1561, when it was used together with the old method of coining by the hammer, until the latter was wholly laid aside in the 14th Charles II., A.D. 1662. From that time to the present, only very trivial improvements have been made, and the machine continues to be worked. It consists of a screw, to which the upper die is connected; this is worked by a fly, and forces that die which is attached to it with considerable force upon the other die, which is firmly fixed below. The advantage of this machine (known by the name of the mill and screw) over the old mode of striking with a hammer consists chiefly in the increase of force, which is so great as to raise the impression at one blow. The edges of the hammered money were left in a rude and unfinished state, which rendered them peculiarly liable to be diminished by clipping. After the mill was introduced, the coins began to assume a form nearly circular, which admitted of some addition to the impression, for the purpose of preserving the outward edge. This was first attempted by placing a graining so as to form a regular circle on the outside of the legend, quite to the edge of the coin. The earliest specimens of Elizabeth's milled money present instances of this invention. Afterwards, a legend was imprinted upon the edge of the larger pieces; but this, it is believed, did not take place until the year 1651, for the earliest instances of it which are known occur upon

the coins made by Blondeau and Ramage, for the Commonwealth, of that date. This impression is given to the edge of the coin by passing it between two plates, one of which is fixed, and the other moveable by a pinion which works in teeth on the back edge of it. One half of the legend is engraved on each of these plates, so that when the coin has been carried by the moveable plate to the end of that which is fixed, it is then marked upon the whole of the edge. This machine was invented by M. Castaing, in 1685, and was introduced by him into the French mint. (Boizard, *Traité de Monnoyes*, tom i., p. 142.) Before this invention the letters were impressed upon the edge by including the blanks in a collar which contained the legend, and was of the same diameter as the piece, but of less thickness. The metal, thus placed, being struck with the die, expanded under it, and received the form of whatever was engraven on the inside of the collar, which opened with four joints in order to permit the coins to be taken out.

As it is scarcely practicable to impress a legend upon the rim of the smaller coins, a graining has been devised for the protection of their outer edge. This, which is generally known by the technical term milling, was first used in 1663, the strokes at that time going at right angles across the edge. That mode continued until 1669, when diagonal strokes were introduced. But these also being found insufficient for the purpose, angular strokes were devised in 1739, which added something to the difficulty of counterfeiting the milling; and the edge of the coin was still further protected by placing the top of the letters as close as possible to it. The position of the letters close to the edge of the coin, which first appeared upon some of the guineas of William and Mary, is still continued.

From the money, when completely finished, two pieces are to be taken from every fifteen pounds weight of gold, and two, at least, from every sixty pounds weight of silver, one for the private assay within the mint, and the other for the trial of the Pix.

The following is the process which at present takes place, from the time at which an ingot of gold is imported into the mint, to the period when it is issued from the mint in the shape of money, as stated in evidence to the committee on the royal mint, April 18, 1837, by J. W. Morrison, Esq., the deputy-master.

'The bullion or ingots are brought to the mint, and it being ascertained that such ingot has been melted by approved refiners in the trade, and also an assay upon the purchase by the king's assayer, they are taken into the master's assay-office, where pieces are cut out for him to assay; the ingots are then locked up under the keys of the deputy-master, comptroller, and king's clerk, and as soon as the ingots are reported by the master assayer, they are weighed by the weigher and teller in the mint-office, in the presence of the importer and the mint officers and the clerks, who calculate the fineness of each ingot, and ascertain the standard value of the whole importation, when a mint bill and receipt is given to the importer, signed by the deputy-master and witnessed by the comptroller and king's clerk; the mint being bound to return an equal weight of standard coin. The ingots are then made up into pots of a certain weight, and a portion of alloy or fine metal calculated, which is to be added in the melting to produce the standard; they are then cast into bars fit for the moneyer's operation; an assay being made by the king's assayer, with reference to the delivery of the bars, from a sample taken from each pot by the surveyor of melting for that assay, the moneyer rolls the bars to proper thickness, and cuts out the piece for the stamping of the intended coin; and having made that piece of the right weight, they are coined, and are put into bags of a given weight to be examined by the king's assayer, the comptroller, the king's clerk, weigher and teller, at the process called the pix. The money is then locked up till the assay is reported by the king's assayer, when it is delivered to the owner weight for weight, as expressed in the mint bill which had been given, and which bill and receipt are then returned.'

The reader who desires more extensive information than is here given upon the subject of the mint must consult the *Report from the Select Committee of the House of Commons*, already referred to, in the Appendix to which he will also find a large collection of papers relating to the French mint, the mint of the United States, and the Dutch mint. [BULLION; EXCHANGE.]

MINU'CIUS, FELIX, a Latin Christian writer of the third century, was a native of Africa, came to live at Rome, where he exercised the profession of advocate, and was much admired, according to the report of Lactantius and Jerome, for his eloquence. We have a work by him, entitled 'Octavius,' which is a dialogue between a Christian called Octavius and a heathen called Cæcilius, concerning the merits of the two religions which were then striving for supremacy. In this dialogue, Octavius repels the absurd imputations of the heathens against the early Christians, whom they accused of all sorts of impurities and crimes in their religious meetings. Through fear of persecution these meetings took place mostly at night and in concealed places, which circumstances exposed them to the obloquy of vulgar ignorance. At the same time Octavius retorts upon his co-disputant by exposing the notoriously licentious practices of the heathens. The style of this work is argumentative and sufficiently pure; the language is animated, and the mode of treating the subject attractive, being mixed up with mythological learning and much information concerning the customs and opinions of that interesting period. As an apology of Christianity, the work of Minucius Felix, is a companion to those of Clemens Alexandrinus, Athenagoras, Theophilus of Antioch, Justinus, Tertullianus, and other early advocates of the Christian faith in its times of trial and depression, and forms a link between them and those of Arnobius, Lactantius, Eusebius, Ambrose, and the other fathers of the fourth century. The dialogue of 'Octavius' has gone through many editions, among which those by James Gronovius, Leyden, 1709, and by Davis, Cambridge, 1712, deserve notice. The latter is accompanied by numerous notes by Dr. Davis and others, and a dissertation or commentary by Balduinus. The 'Octavius' has been translated into French by the Abbé de Gourcy.

Another work, entitled 'De Fato,' against astrologers, is mentioned by Jerome as being ascribed to Minucius, although Jerome expresses doubts concerning its authorship. This work is lost.

The 'Octavius' was at one time attributed to Arnobius, and was inserted as the 8th book of his Disputations 'Adversus Gentes.' Bouchard has published a *Dissertation on Minucius*, Kiel, 1685.

MINUET (*menuet*, Fr.), a graceful slow dance, which, according to Brossard, had its origin in Poitou, and, we conjecture, first made its appearance either in the middle or towards the end of the seventeenth century, for the term is not found in Mersenne, but is met with in the operas of Lully. Ménage derives the word from *menu*, 'little,' the paces of the minuet being small.

The minuet, as a dance, consists of two strains or parts, of eight bars each, in three-crotchet time, and both are repeated: but as it seems to have been introduced together with hoops and hair-powder, so it passed away with them, and, except now and then on the stage, is only seen in the dancing-schools. As an exclusively musical movement, in symphonies, quartets, &c., each strain of the minuet generally comprises sixteen bars, both strains being repeated; and it is followed by a second, called the trio; after which the minuet is played once more, straight through. But composers are not very strict as to its length, or to that of its supplement the trio. For the latter kind of minuet we are indebted to Germany: its time is always quick—*allegro*; and when repeated after the trio, the movement is rather accelerated.

MINUTE (*minutum, portio minuta*). [ANGLE; TIME; SEXAGESIMALS.]

MINX, a name for the Vison-weasel.

MINX-OTTER, Pennant's name for the Vison-weasel.

MINZO'NI, ONO'FRIO, more distinguished for the quality than the quantity of his poetry, in which last respect he is only one of the minor bards of Italy, was born at Ferrara, in 1734. He was educated by the Jesuits, and applied himself with great diligence to the study of theology and mathematics; but his forte lay rather in poetry,—it is as a poet, at least, that his name is handed down to posterity. Imbued with the study of Dante and Ariosto, he had caught much of their vigour of thought and energy of expression; and was comparatively careless of those mechanical beauties of versification which, in his time, were too generally accepted as equivalent to genuine poetry. Freshness of thought, distinctness of imagery, and nobleness of language are the characteristics of his poems, which consist chiefly of sonnets. He likewise distinguished himself by his eloquence

in the pulpit so highly, that the citizens of Ferrara struck a medal in honour of him in 1783. In 1780 he was made canon penitentiary of that city, which office he discharged with the most exemplary zeal.

MIOSEN, Lake. [CHRISTIANIA.]

MIRABAUD, JEAN BAPTISTE DE, born at Paris, in 1675, first embraced the military profession, but left it soon after to devote himself to literature. He made himself known by a French translation of Tasso's 'Jerusalem,' which he published in 1724. He was afterwards made a member of the French Academy, of which he became secretary in 1742. He died at Paris, in 1760. Besides the above-mentioned translation, and a very inferior one of Ariosto's poem, he wrote—1, 'Le Monde, son Origine et son Antiquité.' 2, 'Opinions des Anciens sur les Juifs.' 3, 'Sentimens des Philosophes sur la Nature de l'Ame,' and other minor works. The atheistical work called 'Système de la Nature,' which made much noise at the time of its publication, was attributed to Mirabaud, but is known to have been written by the Baron d'Holbach, with the assistance of some of his friends. [HOLBACH.]

MIRABEAU, HONORÉ GABRIEL DE RIQUETI', COUNT OF, was born at Bignon, near Némours, in 1749, of a family which had emigrated from Florence in the thirteenth century, the name of which, Arrighetti, had become Frenchified into that of Riqueti. He was the son of the marquis de Mirabeau, a man of some literary note, the author of 'L'Ami des Hommes' and other works, and one of the leaders of the school of the 'Economistes.' The marquis, though a great advocate of liberty and philanthropy in his writings, was a harsh despot in his own family, and his harshness probably contributed to sour the temper of his son, and to drive him into the excesses which stained his earlier career. Young Mirabeau had violent passions, an ardent imagination, and great abilities. He was fond of pleasure, of love intrigues, and of spending money, and his father knew no better means of checking his irregularities than by obtaining 'lettres de cachet' against his son, and confining him in several state prisons in succession. His first imprisonment was in consequence of a love affair, after which Mirabeau served for some time in the army, on leaving which he married a young lady who had been promised to another. His dissipation however rendered the match an unhappy one; he became encumbered with debts, his father obtained an interdict against him, which declared him incapable of administering his property, and moreover a lettre de cachet, by which he was confined in the castle of Joux, in the Jura mountains. He was then twenty-five years of age. His captivating address won over the commandant of the fort, who allowed him to walk about the neighbouring town of Pontarlier, where he made the acquaintance of a young lady, the wife of an old man who was a magistrate in that province. Mirabeau seduced her, and carried her off to Holland. This is the person to whom he afterwards addressed several licentious works under the name of Sophie. For this offence the parliament of Dijon condemned him to death *par contumace*.

In Holland Mirabeau began to work for the booksellers as a means of subsistence. While he was thus employed, he was seized by the agents of the French police, with the consent of the Dutch authorities, and was finally shut up in the dungeon of Vincennes near Paris, where he remained more than three years. During his confinement he went through a course of general reading, made translations from Latin and modern foreign authors, formed a collection of extracts, and wrote several works, most of which were of the amorous kind, and some of them obscene. He also carried on a correspondence with his mistress Sophie, which was published after his death.

On his release in 1780 he wrote his work 'On the Lettres de Cachet, and on State Prisons,' which made a deep impression on the public. Repairing to Pontarlier, he pleaded his own cause and that of his mistress, and compelled the husband to enter into a compromise by which the prosecution was quashed.

About 1784 he visited London, where he became acquainted with Romilly. From England he wrote his 'Letters to Chamfort,' in which he praised the institutions of the country. 'Mirabeau,' says his friend and biographer Dumont, 'was then engaged in a work on the American order of Cincinnatus, and he had in his portfolio plans and sketches of several other works, upon which he took good care to consult every person capable of affording him information. He was then poor, and obliged to live by his writings. He wrote his "Doutes sur la Liberté de l'Escaut" (or Considerations on the Navigation of the Schelde) from a letter by Mr. Chauvet, which gave him the first idea of the work.

'Having become acquainted with a geographer, he began to think of writing a universal geography. Had any one shown him the elements of Chinese grammar, he would, I have no doubt, have attempted a treatise on the Chinese language. He studied a subject while he was writing upon it, and he only required an assistant who should furnish matter to him. He could contrive to get notes and additions from twenty different hands; and had he been offered a good price, I am confident that he would have undertaken to write even an Encyclopædia. His activity was prodigious. If he worked little himself, he made others work very hard. He had the skill of finding out men of talent, and of successfully flattering those who could be of use to him; he worked upon them by means of insinuations of friendship and of ideas of public benefit. His interesting and animated conversation was like a hone which he used to sharpen his tools. Nothing was lost to him; he collected with care anecdotes, conversations, and thoughts; appropriated to his own benefit the fruits of the reading and study of his friends; knew how to use the information thus acquired so as to appear to have always possessed it; and when he had begun a work in earnest, it was seen to make a rapid and daily progress.' (Dumont's *Recollections of Mirabeau.*)

The above sketch by a clever and impartial friend of Mirabeau gives an insight into the versatile character of this remarkable man, who might be styled the Alcibiades of the French revolution.

In 1786, Mirabeau's abilities having become known, he was employed by the French minister Calonne, on a secret mission to Berlin, where he spent about eight months, and witnessed the last days of the great Frederic, and the beginning of the reign of his weak successor. On his return to France he wrote his work, 'De la Monarchie Prussienne,' which was compiled from very good materials that he had obtained at Berlin. He also published an 'Histoire Secrète de la Cour de Berlin,' which contains many scandalous anecdotes, and which the French government caused to be burnt by the hand of the public executioner. He was paid twice for this work: once by the French minister Montmorin, for suppressing it, and a second time by the bookseller for publishing it.

It was about this time, in the latter part of 1788, that Dumont became acquainted with Mirabeau, whose character then stood very low even in Paris, in consequence of his law-suits with his family, his elopements, his imprisonments, and his licentious character, so that his acquaintances were almost ashamed of seeing him. He was at one time connected with Calonne and the other enemies of Necker, against whom he wrote several pamphlets. He published also a 'Letter' to the new king of Prussia, an 'Address to the Batavians' on the disturbances then existing in Holland, and a 'Letter to Joseph II.,' all of which are remarkable for their turbulent tone. He wrote likewise an 'Essai sur la Secte des Illuminés,' and a 'Lettre sur Cagliostro,' in which he exposed that impostor. His reputation as a writer stood very high, although he was indebted to his friends for most of his materials.

The convocation of the States-General, in 1789, opened to Mirabeau a new and brilliant career. Two years before he had attended the assembly of the Notables, to which he acted as secretary. He now presented himself before the states of Provence as a candidate for representing that province in the States-General, but he was rejected by the nobles on the ground of not being possessed of any fief. The true reason was that he was disliked, not so much for his irregular conduct as for the bold attacks which he made upon exclusive privileges.

He then offered himself as a candidate to the Tiers Etat, or Commons, and was returned to the States-General for both the towns of Aix and Marseille. He chose to sit for the former, but he paid a visit to Marseille to testify his gratitude to the citizens who had given him their votes, and was received in triumph. In the midst of his success however he showed himself a friend to social order, and by his personal influence repressed the disorders of the populace, which had broken out in alarming riots both at Marseille and at Aix. It is Mirabeau's peculiar boast, that

throughout his political career his passions and party feelings never got the better of his judgment; he always remained master of himself; he knew where to stop, and where others ought to have stopped. Whilst Brissot, Barnave, Siéyes, Pétion, and others had chiefly in view the temporary triumph of their respective parties or systems, Mirabeau saw farther; he weighed the ultimate consequences of the measures that were agitated, and he looked to the permanent welfare and security of France, and to the establishment of an orderly rational government.

At the beginning of the great dispute between the two privileged orders and the third estate concerning their mode of sitting and of voting, Mirabeau opposed the motion of the Breton members, that the third estate should assume the title of the National Assembly, regardless of the other two orders. Instead of this he proposed a deputation to the clergy to invite them, 'in the name of the God of peace,' to join the Commons. This step however proving fruitless, Siéyes proposed to send a last message to the privileged orders, to request them to repair to the common-hall of the States, in order to verify their respective powers, and to judge as in default those who should not appear. That very day Mirabeau, foreseeing the consequences of the motion, requested an interview with Malouet, the personal friend of the ministers Necker and Montmorin, and told him that he was the friend of rational liberty; that he saw the storm which was impending, and that the question now was, whether the monarch and monarchy should outlive its fury. 'There are,' said he, 'among ourselves (in the third estate) several hot-headed dangerous men. In the ranks of the aristocracy the clever men have no common sense, and among the fools I know several who are capable of setting fire to the gunpowder and blowing us all up in the air. You, sir, are the friend of M. Necker and of M. de Montmorin; I do not like either of them, and I do not suppose that they like me, but that is of no consequence, provided we can understand each other. I should wish to know their intentions, and I request a private conference with them. They would be very guilty or very short-sighted, if they expected to deal with the present States-General as former ministers have dealt with those assemblies in the old times of the monarchy. That cannot now be. They ought to have a plan of conduct based upon certain principles for the interest of the monarchy; if that plan is reasonable, I shall engage to support it, to prevent the invasion of democracy which threatens to overwhelm us.' Malouet was delighted with the proposal, for he was aware of Mirabeau's power among the Commons, but the two ministers received the offer coolly, and Necker, having at last consented to see Mirabeau, asked him, in a distant supercilious manner, what proposals he had to make? Mirabeau offended at the word 'proposals,' answered in a few sharp words and went away to the assembly. In passing by Malouet he whispered to him, 'Your friend is a fool; he will hear of me again by and by.' To the honour of Mirabeau it must be said this feeling of irritation was transient, and that in the momentous discussions that followed, his pique against the minister did not carry him beyond the bounds which he had already prescribed to himself.' (Droz, *Histoire du Règne de Louis XVI.*, Paris, 1839.)

On the 15th of June, when the Commons were deliberating on the name which they were to assume, Mirabeau, after observing that the obstinacy of the privileged orders was inexcusable, that the third estate was evidently in the right, and that for this very reason they ought to avoid taking extreme measures, which are the last resource of despair, and theirs certainly was not a desperate situation, continued thus: 'You cannot constitute yourselves as the States-General, because that denomination implies three orders, and the three orders certainly are not here. Will you assume another synonymous denomination, implying that you are the representatives of the whole nation? You will still require the king's sanction; you cannot do without it, if you mean to impart legality to your resolutions.' He then proposed to assume the title of 'Representatives of the people.' But in France the word 'people' had by long abuse become a word of contempt. Mounier proposed the title of 'Assembly of the majority of the Deputies deliberating in the absence of the minority duly invited and not appearing.' But this title was too long. The discussion occupied four sittings. Siéyes, Barnave, and Camus denied the necessity of the royal sanction. 'As for me,' replied Mirabeau, 'I hold the king's sanction to be so indispensable, that if he had it not, I should prefer living at Constantinople rather than in France. I declare to you that nothing appears to me more fearful than the sovereign aristocracy of six hundred deputies, who to-morrow perhaps might take it into their heads to declare themselves permanent, the next day hereditary; and which would end, like all aristocracies in the world, by invading and usurping all the powers of the state.' And he continued to support his proposed title of representatives of the people. 'Are you not the elect of the people? And do you blush at the name? Will you tell your constituents that you disdain the title which they have conferred upon you, that it is not brilliant enough, not pompous enough for your taste? More clear-sighted than we, the heroes of the Netherlands adopted the name of "gueux" which the insolence of their tyrants had cast upon them: the founders of Swiss liberty prided themselves in that of "boors," and these names, by rallying to their cause whole multitudes oppressed by aristocracy and despotism, became their strength and the pledge of their success. . . . .' Mirabeau's opinion however was violently opposed, and the denomination of 'National Assembly,' which had been sometimes used to designate the States-General, was adopted on the 17th of June, on the motion of Siéyes, the minority who voted against it consisting of ninety deputies. Mirabeau absented himself to avoid voting on the question. He wrote to his friend Major Mauvillon of the Prussian service as follows: 'Supposing even that the king should give his sanction to the new title which we have assumed, it is still true that the deputies of the third estate have staked a kingdom at a game of chance, whilst I wished to play at a game of chess in which I was the strongest. It is certain that the nation is not ripe. The excessive ignorance, the frightful disorders of the government have forced a hot-house revolution, and we are carried beyond our capabilities and our instructions.' (*Lettres de Mirabeau à un de ses amis en Allemagne.*)

But the great step once taken by the Commons, Mirabeau was faithful to them, and boldly supported the rights which they had assumed. After the memorable royal sitting of the 23rd June, in which Louis ordered the three estates to deliberate in separate chambers, the deputies of the Commons still retained their seats in the common hall; and when the Marquis de Brézé, grand master of the ceremonies, reminded them of the king's orders, Mirabeau rose and said: 'We have listened, sir, to the intentions which have been suggested to the king; but you, who cannot act as his interpreter to the National Assembly—you, who hold here neither seat, nor vote, nor right of speaking—you are not a fit person to remind us of his speech. Go, and tell those who have sent you, that we are sitting here by the power of the people, and that bayonets alone can drive us hence.' All the deputies cried out, 'That is the vote of the Assembly, and our firm resolution;' and the grand master withdrew. When he reported to Louis the answer of the Commons, the king, after a few moments' silence, said peevishly, 'Well, if they will not quit the hall, let them stay in it.'

Mirabeau was now acknowledged as the chief leader in the National Assembly, and he continued to hold this supremacy for nearly two years, till the time of his death. Without belonging exactly to any party, he was courted or feared by all. He wished to form a party truly national; and on the 27th June he made a speech, in which, after telling his colleagues that agitation and tumult could only be favourable to the enemies of liberty, he exhorted them to calm the people, and save them from the excesses into which a furious zeal might lead them. 'The number of our enemies is greatly exaggerated, for we must not consider as enemies all those who do not think as we do. Many of them wish the public good as much as we do, but they seek it by a different road; many are still biassed by early impressions and the habits of education; others, seeing us take a position without a precedent, are alarmed for their property; they fear that liberty may become a pretext for licentiousness and anarchy. All these men deserve our regard, our consideration.' And he drew an eloquent sketch of the advantages which a rational constitution would ensure to France; the equality of taxation, the freedom of industry, economy in the finances, the written law substituted for ministerial caprice.

Louis XVI., after having sanctioned and even commanded the union of the three estates into one National Assembly, allowed his courtiers to collect a great number of troops near Paris and Versailles, as if to overawe that assembly.

It was then that Mirabeau, on the 8th of July, in an eloquent speech, denounced the measures of the court as a plot against the independence of the representatives of the nation, and moved a firm though respectful address to the king, whom he excused, as if unconscious of what was being done in his name, requesting him to remove the troops from the neighbourhood of the capital. The address was voted in the midst of acclamations. It has been said that this address, as well as many of Mirabeau's speeches, was written for him by others. But his oratorical powers are proved by his extempore speeches and replies, which, as well as his prepared speeches, have the same form and pressure, the same logic, the same inspiration, and his own peculiar bold and somewhat careless manner. He doubtless made use of notes with which his friends supplied him, but he had the art of making them his own, and stamping them with his original character. This is fully and honourably acknowledged in many places by Dumont himself, who claims (and we see no reason for questioning his statement) the greatest share in having written for Mirabeau.

Louis XVI. made an evasive answer to the address; the people of Paris took the alarm, which was increased by the sudden dismissal of Necker, and an insurrection, led by Danton, Camille Desmoulins, Santerre, and others belonging to the club of the Palais Royal, broke out in the capital, which led to the destruction of the Bastille on the 13th of July, and the organization of the militia of Paris. During this stormy period Mirabeau was constantly with the Assembly, day and night, at Versailles, supporting the firmness of the members, insisting on the necessity of the king withdrawing the troops from the capital, and sending repeated deputations to the palace for that purpose. The king at last consented to remove the troops, and went himself to Paris on the 17th, where he sanctioned the formation of the new municipality, the arming of the militia, and other popular measures. The Revolution was now complete, and the old monarchy was dead. It has been said that Mirabeau had conspired with the Paris insurgents, in order to make the duke of Orleans lieutenant-general of the kingdom; but this accusation, as referring to that epoch, was at least premature. Mirabeau may have known or suspected the intentions of the party of the duke of Orleans, but he also knew the weakness of the duke's personal character, his bad reputation, and his want of popularity; whilst Louis was still very popular with the people at large. At a later period, on the 5th and 6th of October, when the populace of Paris went to Versailles, insulted the royal family, and threatened their lives, a plot was attributed to the duke of Orleans, and Mirabeau was implicated in the supposed conspiracy; but the National Assembly declared that there was no ground of accusation against either. Dumont, who lived at that time in Mirabeau's intimacy, examines the matter pretty closely, and, in the end, leaves it in doubt. That some communications from the duke's party were made to Mirabeau through Laclos, the unprincipled author of the 'Liaisons Dangereuses,' and a familiar of the duke, seems certain; but the intentions of the conspirators, and how far Mirabeau participated in them, are still involved in mystery. Dumont seems to think that the object of the movement was to frighten the king away, and then to appoint the duke lieutenant-general of the kingdom, in which case Mirabeau might have supported him in the Assembly, and have been appointed in return prime-minister, which post was the object of his ambition.

Mirabeau was one of the committee of five appointed to present the model of a declaration of the rights of man, on the motion of the metaphysician Sièyes.

Mirabeau was, from the first, opposed to this declaration, which he considered as a puerile fiction. He however set about the task with his friends Dumont, Claviere, and Duroveray; and 'there were we, writing, disputing, adding, striking out, and exhausting both time and patience upon this ridiculous subject. At length we produced our piece of patchwork, our mosaic of pretended natural rights, which never existed. The principles intended to be established by this declaration are dangerous in themselves; for legislators should not be tied down to general propositions, which they are afterwards obliged to alter and modify; above all, they must not be cramped by false maxims. Men are born free and equal! That is not true; on the contrary, they are born in a state of weakness and necessary dependence. Equal! how are they so, or how can they be so? If by equality is understood equality of talents, of virtue, of industry, of fortune, then the falsehood is manifest.' Mirabeau, on presenting the project to the assembly, ventured to make some objections to it, and proposed to defer the declaration of rights until the constitution should be completed. 'I can safely predict,' said he, 'that any declaration of rights anterior to the constitution will prove but the almanac of a single year!' He however withdrew his motion out of weariness and disgust, and the declaration was decreed. (Dumont's *Recollections*.)

During this discussion the violent members of the Breton club (afterwards the Jacobin club) charged Mirabeau with abusing his talents, as if he wished to involve the assembly in contradictory resolutions; and one of them, stooping to personalities, reproached him with the irregularities of his private life. Mirabeau answered, with dignified calmness, 'No doubt that in the course of a stormy youth, partly by the fault of others, but chiefly by my own, I have committed many wrongs, and that there are few men who have afforded more matter for bad report and more pretexts for slander; but I dare attest to you all, that as a public man, as a political writer or speaker, no one can boast of greater courage, independence, disinterestedness, or of greater uniformity and consistency of principles. Thirty volumes of writings are there to prove my assertion.'

Then came the famous night sitting of the 4th of August, in which the assembly, on the motions of several members of the nobility and clergy, abolished feudal rights, game-laws, tithes, privileges, and indemnities, pensions not for actual services, the corporations of trades, and all the provincial franchises, states, and assemblies, as well as the charters of peculiar towns; questions involving an entire political system were decided in a few hours, put to the vote, and passed by general acclamation. From this sitting Mirabeau, Sièye, and other leading members happened to be absent. The following day the first two strongly reprobated this hurried work; Sièyes made a speech against the sudden abolition of tithes, which he ended by the words, 'They want to be free, and know not how to be just.' Mirabeau exclaimed to Dumont, 'This is just the character of our Frenchmen; they are three months disputing about syllables, and in a single night they overturn the whole venerable edifice of the monarchy.'

The next important discussion was that on the king's veto. Mirabeau had determined to support the absolute veto, which, in the absence of a second or upper house, he considered of vital importance to the monarchy. His speech on the occasion excited much surprise and dissatisfaction among the deputies. Sièyes opposed the absolute veto, and Barnave and Pétion proposed a suspensive or temporary one. Their motion was carried. Mirabeau did not vote on that occasion; and such was the importance which even his antagonists attached to his name, that Camille Desmoulins and other democrats boldly asserted that he had voted in their favour.

Mirabeau's speech on the national bankruptcy was to him a complete triumph. In this speech he supported the minister Necker, to whom he was personally hostile, in his plan of a forced loan to make up the deficit in the revenue. Several members had proposed modifications, which Mirabeau thought would destroy the effect of the measure. He proceeded to remark upon the dangerous state of the public credit, the failure of the revenue, and represented a national bankruptcy, with all its horrors, as the probable consequence of the rejection of the plan. The force with which he presented so commonplace a subject was miraculous: he elevated it to sublimity. They who heard that speech never forgot it. No attempt was made to reply: the assembly was subjugated by the power of a superior mind, and the project was adopted unanimously. 'From that day Mirabeau was considered as having no rival in the assembly: there were indeed other orators, but he alone was eloquent; and this impression was stronger, because in his speech on this question he was obliged to depend entirely upon his own resources; for it was an unexpected reply, and could not therefore have been prepared.' (Dumont's *Recollections*.) Molé, the celebrated actor at the Théâtre Français, was so struck with the force of Mirabeau's eloquence and the brilliancy of his delivery, that, approaching the orator with visible emotion, 'Ah! monsieur le comte,' said he, in a pathetic tone of voice, 'what a speech! and with what an accent did you deliver it! You have surely missed your

vocation.' Mirabeau was by no means displeased at this singular compliment.

After the removal of the assembly to Paris, some negotiations were entered into for bringing Mirabeau into office. Necker had nearly agreed to it, and the king was about to consent; but Mirabeau's condition was, that he should remain member of the assembly, without which he felt that his taking office would be of no use. Suspicions of the scheme having been bruited about, some of his antagonists, of Lameth's party, moved that no minister should be a member of the assembly. Mirabeau in vain opposed the motion, which was carried by a feeble majority. He appealed to the usage of the English parliament, but this appeal told against himself; for the least idea of imitation offended the pride of the innovators, who pretended to establish a monarchical form of government, without preserving a single element of monarchy. 'We are not English, and we want nothing English,' was the reply on such occasions.

Mirabeau was one of the first to propose a martial law to put down the insurrections which had then become extremely frequent all over France. The law was passed on the 19th of October, notwithstanding violent opposition; and, strange to say, Mirabeau's popularity was not affected by it.

About November of the same year Mirabeau unexpectedly communicated to Dumont a plan to draw the king away from Paris. After placing him in Metz or some other strong fortress, amidst faithful troops, he was to appeal to the people by proclamation, to dissolve the assembly, and order an immediate election of fresh deputies. Mirabeau was to remain at Paris, and watch the motions of the assembly; and, as soon as the royal proclamation should appear, he expected to induce all the moderate members to separate from the rest and follow the king. Mirabeau represented this plan as the only thing by which France could be saved from complete disorganisation. Dumont strongly remonstrated against the plan, and Mirabeau acknowledged to him that it had originated with the court party, and that he had intended to co-operate in the movement, in order to direct it in favour of liberty; 'otherwise,' said he, 'it will only lead to new errors and the total ruin of the country. If the plan does not succeed, the monarchy is lost.' Dumont represented to him that he would most probably be made use of only as a tool, and then discarded as a victim. A few days afterwards Mirabeau told him that the plan was given up, and the affair remained a secret.

During the year 1790, Mirabeau continued to hold the first rank as a leader of the National Assembly. He supported the law for the sale of church property in order to pay off the national debt, but with some restrictions in favour of the actual possessors, which restrictions were however disregarded. He also supported the issue of assignats or bonds on the security of that property, but limited their issue to a fixed amount. He also proposed, at Dumont's suggestion, a plan of gradual elections, by which a citizen should have to exercise certain civil functions for a stated period in order to qualify him to become a deputy to the legislature. This motion was at first received with favour by most members both of the right and left sections of the assembly, but Lameth, Barnave, and some others looked upon it as an aristocratic snare; they moved and carried an adjournment, and the motion was ultimately lost. In the important discussion on the right of peace and war, he declared, to the great dismay of the democrats, that the king ought to be invested with this prerogative, and supported his opinion by a logical and brilliant speech. Barnave opposed him, attacked Mirabeau violently, accused him of inconsistency, ridiculed his system, was cheered by the left side, and by the people in the galleries, and received with acclamations by the people out of doors, whilst cries of 'à la lanterne' resounded against Mirabeau. The debate was adjourned. The next day a libel was hawked about the streets with this title in large capitals:—'The great treason of the Count de Mirabeau,' in which he was accused of bribery. The paper was shown to him as he entered the assembly: he glanced at it, and said, 'I know it all; I shall leave the house either triumphant or in pieces.' He ascended the tribune amidst the most profound silence: 'For several days past,' said he, 'the section of this assembly which wishes for the king's assent in questions of peace and war has been represented as hostile to public liberty; rumours of treason and corruption are artfully spread about; popular vengeance is invoked to support the tyranny of party opinions. I also, whom a few days ago they wanted to carry in triumph, I hear myself now proclaimed in the streets as a great conspirator. I did not require this lesson to remind me that there are only a few steps between the capitol and the Tarpeian rock; but a man who wishes to be useful to his country, who cares little for the vain celebrity of a day, is not easily overcome; he expects his reward from his conscience and from time, the incorruptible judges of us all. I shall therefore resume the question in debate, and explain the true point of contention with all the clearness I am capable of.' He then repeated the objections of Barnave, maintained his former opinion, and urged it with redoubled force. He saw in the eyes of the audience the certainty of his triumph, and stopping rather abruptly, he concluded, in an ordinary and careless tone, with these words:—'I think, gentlemen, that the real point in debate is now well known, and that M. Barnave has not at all touched the question at issue. It would now be for me a task too easy and irrelevant to follow my opponent throughout his accessory details, in which, if he has shown a certain talent, he has not exhibited the least knowledge of state or worldly affairs. He has declaimed at length about the mischief which absolute kings can do and have done, but he has not observed that in our constitution the monarch is no longer absolute, and cannot act arbitrarily, and he has, above all, completely abstained from speaking of the evils resulting from popular movements.' Mirabeau left the tribune amidst a thunder of applause, which lasted for many minutes. His triumph was again complete, and his opinion prevailed.

He opposed the violent measures proposed against emigration, saying that it was tyrannical to interfere with the locomotive faculties of individuals—that such restrictions could not be carried into effect—that he, for one, would not obey them—and as the extreme left became louder and louder in their marks of disapprobation, he fixed his eyes upon them imperiously, and cried out with a voice of thunder, 'Silence aux trente voix' (silence, you thirty votes); and the extreme left quailed before him, and was silent accordingly.

On the question of the regency he told the assembly to judge for themselves, and not to heed the shouts out of doors; he told them that the very people who were applauding them to-day would shout still louder were they to see them some other day on their way to the scaffold; and at that moment a loud cheer from the galleries seemed to confirm Mirabeau's prediction.

Thus did this extraordinary man, while crushing the old aristocracy with one hand, repress the fury of the democratic faction on the other. Hardly disguising his contempt for the intellectual capacity of most of his colleagues, he still kept them all in awe; and while openly asserting his independence of clubs, and factions, and mobs, he retained his popularity to the last even with the lowest populace.

'Our little mother Mirabeau' was the endearing nickname which the fishwomen of Paris, who sometimes graced the galleries of the legislature with their presence, applied to him.

Mirabeau, assisted by Dumont and others, edited a journal entitled at first, 'Journal des Etats-Généraux,' and afterwards 'Courier de Provence,' which gave a clever and tolerably impartial report of the proceedings of the National Assembly, until about the middle of 1790, when it was forsaken by its original founders, and retained nothing of its former character except the name.

In January, 1791, Mirabeau was named president of the National Assembly. 'Never had this office been so well filled; he displayed in it a new kind of talent. He introduced a degree of order and clearness in the proceedings, of the possibility of which no member had previously the least conception. He simplified forms; he could render the question clear by a single word, and also by a single word put down tumult. His regard for all parties, the respect he always paid to the Assembly, the precision of his observations, and his answers to the several deputations at the bar—answers which, whether prepared or extempore, were always remarkable for dignity and elegance, and satisfactory even while conveying a refusal; in short, his activity, his impartiality, and his presence of mind increased his reputation and added splendour to his talents, in an office which had proved a quicksand to several of his predecessors. He had the art of fixing the general attention even when, being no longer able to speak from the tribune, he seemed to have

foregone his most valuable prerogative. His enemies, who were jealous of his eloquence, and had voted him president in order thereby to cast him into the shade and reduce him to silence, were bitterly disappointed when they saw him add another wreath to the chaplet of his glory.

'He was far from enjoying good health at this time. "If I believed in slow poisons," he said to me, "I should think myself poisoned; for I feel that I am dying by inches—that I am being consumed in a slow fire." I observed to him, that his mode of life would long ago have destroyed any man less robust than himself. Not a moment of rest, from seven in the morning till ten or eleven at night; continual conversations and altercations; agitations of mind and excitement of every kind; too high living, at least as regards food—for he was very moderate in drink. "You must," I said, "be a salamander, to live in the fire which is consuming you." Like all public and ambitious men, in their moments of ennui and fatigue, he entertained at times thoughts of retiring from public life. The irritation of his system at this time produced violent attacks of ophthalmia; and I have seen him, whilst he was president of the National Assembly, sometimes apply leeches foi his eyes in the interval during the adjournment of the sitting from the morning to the evening, and attend the Assembly with his neck covered with linen to staunch the blood.

'When we parted for the last time (Dumont was going to Geneva for six months), he embraced me with an emotion which I had never before seen him evince. "I shall die at the stake, my dear friend," said he, "and we shall never perhaps meet again. When I am gone, my value will be appreciated. Misfortunes to which I have put a stop for the present were overwhelming France in every direction; but that base faction, which I now overawe (the Jacobins), will again be let loose upon the country. I have none but direful anticipations. Ah! my friend, how right were we when, at the beginning, we tried to prevent the Commons from being declared a National Assembly. That was the origin of the evil. Since they have carried that point, they have not ceased to show that they are unworthy of confidence. They wanted to govern the king, instead of being governed by him; but soon neither they nor he will govern; a vile faction will rule the country, and debase it by the most atrocious crimes." Three months after this conversation Mirabeau was no more.' (Dumont's *Recollections of Mirabeau.*)

Mirabeau died on the 2nd April, 1791, of a short but violent disease, the result of his mode of living and of continual excitement. During his illness he suffered much, but endured his pain with sufficient calmness and resignation. He repeated to Talleyrand, who attended him, the same gloomy prognostications on the result of the actual struggle in France which he had before expressed to Dumont, and his determination, had life been spared to him, of supporting the king's constitutional authority against the attacks of the anarchists. 'I carry with me to the grave,' said he once, 'the last shreds of the monarchy.' He had been for some months in correspondence with the court, and had proposed a plan for dissolving the Assembly by the force and will of the nation itself, by getting up addresses from the departments, without having recourse to foreign armies or destroying the people's hope of freedom; for a new assembly was to be convoked forthwith, which would have revised the constitution. Mirabeau never intended to restore absolute power: he knew too well that he would have destroyed himself by such a measure; but all his ambition during the latter period of his life was centred in the idea of becoming prime minister of the constitutional monarchy of France, and he thought, that once in that office, he should eclipse every minister who had preceded him, and that he would attract within the sphere of his patronage all men of distinguished abilities, and thus form a halo of talents whose brightness should dazzle Europe. (Dumont; Bouillé's *Memoirs.*) Cabanis, then a young physician, published an account of Mirabeau's illness and a copy of his will. He died encumbered with debts. 'Much has been said of the venality of Mirabeau,' says Dumont, 'as if his talents were actually put up to the highest bidder; but this is an exaggeration. It may be admitted that he was not over-scrupulous in money matters, but he was too proud to be dishonest; and he would have thrown through the window any one who dared to make to him a humiliating proposal. At one time he received a pension from Monsieur (afterwards Louis XVIII.), and subsequently, during the last six months of his life, one from the king; but he considered himself as an agent entrusted with their affairs, and he accepted those pensions, not to be governed by, but to govern and direct those who granted them.'

Mirabeau was a brilliant orator, and a fluent though not original writer. The great characteristic of his genius consisted in his political sagacity, his anticipation of events, and his knowledge of mankind. No man at the time, at least in France, saw so far as he did into futurity, and his forebodings of impending calamities were attributed to disappointed ambition. But while he prognosticated the downfal of the monarchy, he had the most lively anticipation of the future destinies of his country. In a letter to Major Mauvillon, of the Prussian service, he said that he considered France as able to resist all Europe; and his correspondence contains many singular passages which show the wide range of his political views. At home he detected by his instinctive penetration the feelings of the principal members of the National Assembly, and often embarrassed his opponents by revealing their secret motives, and laying open that which they were most anxious to conceal. The severity of his judgments has been justified by succeeding events; and there has not been a man of any consequence in that assembly the sum of whose conduct has not corresponded with the opinion which Mirabeau had formed of him. His death gave courage to all the factious. Robespierre, Péthion, and others, who dwindled into insignificance before him, immediately became great men, when no longer overawed by his presence. His death was felt as a public calamity by the nation in general; a public examination was made on his body to convince the people that there was no ground for the suspicion of poison: his funeral was conducted with great pomp; all the theatres were closed, the deputies, the ministers, all the public authorities, and a number of other persons, forming a procession of more than two miles in length, followed his remains to the Pantheon, where they were deposited among the illustrious dead.

Little more than two years after, in November, 1793, the body of Mirabeau was disinterred by a decree of the Convention, as that of an aristocrat; and the ferocious and insane Marat succeeded to his honours. So short is the period of popularity in revolutions.

Mirabeau left a natural son, whom he adopted before his death, and who has published memoirs of his father, in 4 vols. 8vo., London, 1835. Besides the numerous works and pamphlets of Mirabeau which were printed in his lifetime, several collections have been published since his death:—'Collection complette des Travaux de Mirabeau à l'Assemblée Nationale,' Paris, 1791; 'Œuvres Oratoires et Choisies de Mirabeau,' 6 vols. 8vo, Paris, 1820.

Mirabeau was tall, thick-set, and naturally robust, but very plain in his features; and yet, when he chose, his manner was extremely fascinating. His large head was shaded by a vast mass of dark hair, which he took great pains to cultivate; and he used to say, when his antagonists were troublesome, that he would shake his locks at them, at the same time assuming a threatening look, which, added to his deep powerful voice, had the effect of completely silencing them.

As the history of Mirabeau's political life is closely connected with that of the States-General, and of the National Assembly, which grew out of them, and which effected the French revolution, it may be proper here to give an account of the formation of that assembly.

The States General were an old institution of the French monarchy. They were at first composed of the deputies of the two orders of the nobility and clergy, and were convoked by the king to consult with him in important cases, and also to furnish the monarch with money by grants styled 'free gifts.' It was a feudal institution, like the early Spanish Cortes and English parliaments. Afterwards, deputies of the chartered towns were admitted into the assembly, and these were called the Third Estate. It would appear that the third estate, or commons, were first introduced into the states-general under Philip le Bel in 1303, on the occasion of the quarrel between that monarch and pope Boniface VIII., about half a century later than the introduction of the knights of the shire into the parliament of England.

There were in France provincial states also, consisting of the three orders, in Provence, Britanny, Burgundy, and the other great fiefs of the crown, which provinces were accordingly distinguished, by the appellation of 'Pays d'Etats,'

from the other provinces directly subject to the crown, which were called 'Pays d'Election.' In the Pays d'Etats the states of each province were asked by the king for a certain subsidy, for which they voted the supply, and regulated the assessment of it, the nobility and clergy paying according to the value of the lands which they held, and this was called the real taille; the merchants, artificers, and tradespeople were assessed according to their wealth and station, which was called the personal taille; but day-labourers and other poor persons were not liable to the personal taille. The Pays d'Election were taxed at will by the king; and the tax called personal taille was assessed upon all the inhabitants by the 'élus,' or notables, of the respective communes. In this as well as in other respects the countries which had states had a decided advantage over the rest. It was also a principle or tradition of the monarchy at large that no *permanent tax* could be levied or maintained throughout the kingdom without the consent of the states-general of all France. There seems to have been no fixed period for the convocation of the states-general: it depended on the humour and necessities of the reigning king. But when they met, they were considered as representing the nation, and as being above all courts of justice and other authorities, and equal to the king himself. On the king's letters of convocation being issued, the deputies for each order were elected by the bailliages, or districts, from each of the three orders. When assembled, each order had its separate chamber or hall for deliberating, and the majority of the votes constituted the vote of the order. The whole assembly therefore may be considered as having three votes, and it may be easily inferred that in questions on which both the nobility and clergy had the same interest, the vote of the third estate was of no avail. But there were other cases in which the other two orders might differ, and the vote of the third estate would prove decisive. When the king came to communicate anything to the states, the three orders assembled in one common hall. This was called a royal sitting, and after the king's departure each order repaired to its separate hall. It is recorded however that on several occasions, and particularly at Orleans, in 1569, they agreed to deliberate together as one assembly, and chose one president for the whole.

The last states-general assembled in France previous to 1789 were convoked under Louis XIII., then just of age, in 1614. They asked for the abolition of certain taxes and duties, which the minister promised, but did not keep his word. The following ministers, Richelieu and Mazarin, and Louis XIV. after them, were little disposed in favour of national representation of any sort, and the states-general became almost forgotten. The disorder of the finances and the refusal of the privileged orders to come to the assistance of the exchequer, added to the remonstrances of the parliament of Paris, and the advice of the minister Necker, decided Louis XVI. to assemble once more the states-general: but the difficulty was to determine the mode of election, about which there was nothing certain or uniform in the records of former states-general; the total number of deputies, as well as the respective number for each deputation or province, having varied greatly. The qualifications of the electors were also differently stated. In 1356 the states consisted of 800 deputies, in 1576 of 326, in 1588 of 506, and in 1614 of 454. Dauphiny in 1576 returned 16 deputies, and in 1614 only 11; Languedoc sent 14 at the former period, and 29 at the latter; Guyenne 27, and afterwards 58. Again, with regard to the proportion of deputies among the three orders, the letters of convocation mentioned a deputy from each order at least for each bailliage, but the baillis generally sent more, especially from the third estate, probably because they more easily found in this estate men who would take the trouble. In 1614 the states-general consisted of 104 deputations, out of which 34 only consisted of an equal number of deputies for each order, 24 had as many deputies of the third estate as for the other two orders, and in others the proportion of the members of the commons was either greater or smaller. The total number of deputies were 140 for the clergy, 132 for the nobility, and 192 for the third estate. In 1789 the question arose as to giving to the third estate in all the bailliages a number of deputies equal to that of the other two, in order that if the states agreed to deliberate in common, as they had occasionally done before, and vote by heads, the third estate might have a fair chance. This, which was styled the double representation of the third estate, was granted by Louis XVI. in his letters of convocation, which decreed that the states should consist of at least 1000 deputies, of whom each bailliage should return a fraction in proportion to its population and the taxes which it paid to the treasury. But the important question remained, whether the three orders should deliberate in common and vote by heads, forming, in short, one house: the Commons desired it, but the other two orders refused. This question the king or his ministers did not decide, and that was the rock on which the monarchy was shipwrecked.

When at last the Commons obliged the other two orders to join them in one National Assembly, the members of the whole body consisted as follows:—48 archbishops and bishops, 35 abbots and canons, 208 parochial incumbents; 1 prince of the blood, 28 magistrates of the superior courts, and 241 gentilshommes or nobles; in all, 291 deputies of the clergy and 270 of the nobility: the third estate was represented by 80 inferior magistrates, 272 lawyers, 16 physicians, 2 clergymen, 11 of the nobility, who, like Mirabeau, had been returned by the Commons, and 176 merchants, landholders, and farmers; in all, 557 members of the third estate. In the course of the session however several members of the nobility and clergy emigrated.

The National Assembly continued its labours for several months after the death of Mirabeau. Having completed the new constitution which it undertook to make for France, it presented it to the king for his sanction in September, 1791. The king accepted the constitution, and the assembly dissolved itself on the 30th of the same month. The French generally designate the first national assembly as 'l'assemblée constituante,' from its having framed the constitution for the kingdom. That constitution lasted about twelve months, after which the republic was proclaimed.

MIRACLES. A man may acquire his knowledge of any event in either of two ways; by his own observation, or by information from others. The knowledge of an event which a man obtains from his own observation is generally, to him, the highest degree of evidence and the surest ground of belief; but not therefore the surest ground of a true opinion. The knowledge of an event which a man derives by information from others is not, to him, so high a degree of evidence as that which he obtains from his own observation; but it does not therefore follow that it is not so sure a ground of a true opinion. All the knowledge which a man derives from his own observation may be called experience: all that he derives from the observation of others may, for the sake of distinction, be called evidence; it is the experience of others communicated to him, either orally or by writing.

Every event which has taken place, or is said to have taken place, may be the subject of evidence. A man who has witnessed an event himself entertains no doubt of its reality, unless he has some suspicion that a fraud was practised, or that for some reason or other the event of which he was a witness was not such an event as it appeared to him to be. An eye-witness therefore of an event has nothing to guard against, so far as concerns his own conviction, but deception by others, or mistake or misapprehension on his own part. When a man derives his knowledge of an event from the information of others, there is, in addition to the causes of error which may exist where he is an eye-witness, the further cause of error which may arise from the witness whose evidence he receives being interested in deceiving him, or being, from whatever cause, disposed to deceive him. There is no supposable event which may not be the subject of evidence; and when all reason for supposing deception, mistake, or intention on the part of the witness to deceive, is removed, there is no event which, when witnessed, does not thereby acquire some degree of probability. It must be admitted that the ascertaining that there is neither deception, mistake, nor intention to deceive, is generally the main matter in estimating the value of evidence; but the estimating the value of the evidence in any given case is a different thing from determining what may be the subject of evidence, which is the matter that we are here considering.

Man is so constituted, that any event alleged to have taken place is at once placed by the mind either among events which are common or among events which are uncommon. In the former case, before any evidence is furnished as to the fact, there is a disposition to believe that it is true; and even the soundest judge of human events, though he will believe no alleged event without sufficient evidence, readily acquiesces in the probability of an alleged

event of a common kind being a true event. In the case of an uncommon event, the matter is different; most persons are indisposed to consider it probable that the uncommon event has actually taken place, and many persons at once assume its impossibility, or at least assume that it has not taken place. But there is no rational ground either for admitting the truth of a common event without sufficient evidence, or for refusing assent to an uncommon event supported by sufficient evidence. An event the most common in the course of human life, an event the probability and possibility of which no man will deny, requires as much evidence in order to be proved as any event the most uncommon or any kind of thing or event that has never been heard of before. In both cases, the testimony of one eye-witness at least is required; and supposing the absence of mendacity in the witness and of all reason for supposing him to be deceived, the uncommon event is proved as much as the common event. How much and what will be necessary in either case to show the absence of mendacity or of deception, is a question that concerns the estimation of the value of the evidence in any given case, and cannot be determined generally.

Thus it appears that an event alleged to have taken place may either be one of a kind that is consistent with a person's experience, or it may be inconsistent with it. But the evidence in support of an event of either description may be precisely the same in degree and kind; it may be the evidence of persons of integrity unimpeached, of judgment approved, and of observation and acuteness unquestioned.

In the two cases supposed, the evidence is precisely the same: the only difference is in the mental state of the person to whom it is addressed. All intention or disposition to deceive, on the part of the witnesses, is by the supposition out of the way, and therefore the case is reduced to that of the receiver of the evidence being an eye-witness, and if he believes the witnesses to have as much penetration and judgment as himself, their evidence is as good to him as his own experience would have been; and if he thinks the witnesses have more penetration and judgment than himself, it is better. There is then no reason why a man should not, under the circumstances supposed, believe an event which is inconsistent with his own experience, as well as one that is consistent with it.

The true cause of all the dispute about the reality of events called miraculous is this: the estimation of the evidence in the particular instance, or instances, has been confounded with the question of evidence generally. As a matter of evidence, any fact may be alleged as the fact to be proved, and the possibility of a proof equal in value to the proof derivable from a man's own observation cannot be denied. But whether any alleged fact has been proved or not, is quite a different question. It is not here said that any supposable fact or event can be proved, but it is said that any supposable fact or event may, by possibility, be supported by evidence as strong as that arising from a man being an eye-witness.

The assertion that any alleged event is inconsistent with experience, may mean either the experience of the objector, or the evidence (that is, the experience) of others; or it may mean both. Taken in its widest acceptation, the assertion cannot be properly made of any fact or event alleged to have taken place; for by the supposition, the event is consistent with the experience of the person who bears evidence to it. If a fact or an event should be told to a person, of which there was no similar event on record, it might be said that experience did not show any similar event; but though this might be a very good reason for examining the evidence most strictly, it is no reason at all against evidence in support of it which is free from all the objections above enumerated.

But it may be said, what does this lead to? It leads to this,—to the admission that any alleged fact or event is a possibility; and it leads to the proper examination of the evidence by which it is supported. Suppose the event to be a shower of stones recorded in Livy. The investigation is relieved of one difficulty by the fact of showers of stones being attested by evidence in modern times much more satisfactory than that of Livy. A man may therefore commence such inquiry by admitting that the particular circumstance recorded by Livy may have taken place; though, if he had not satisfactory evidence of such a kind of events having taken place before, he could not commence his inquiry by making such admission; for the admission that such an event might have taken place could only be made when the event was proved to have taken place, and would then be useless. Further; prior to receiving any evidence, we cannot say that the event is one that could not have taken place. Whether a shower of stones, as recorded by Livy, did fall or not, depends for proof exactly on the same principles as other events recorded by him.

Now many of the facts or events which are called miracles are of the kind which may be considered as unlike any other events on record; the fact, for example, of Jesus raising Lazarus from the dead, which we will suppose, for the present purpose, to be the first event of the kind on record. With reference to an event of this kind, Hume remarks, 'In order to increase the probability against the testimony of witnesses, let us suppose that the fact which they affirm, instead of being only marvellous, is really miraculous; and suppose also that the testimony, considered apart, and in itself, amounts to an entire proof; in that case, there is proof against proof, of which the strongest must prevail, but still with a diminution of its force, in proportion to that of its antagonist.' The opposing proof here referred to is what Hume calls experience, a word which he has used in his Essay in a very loose sense. From what has been said in this article, it will be perceived that the view which the writer takes of evidence is altogether different from that of Hume. If the 'testimony, considered apart and in itself, amounts to an entire proof,' the thing or event is proved, whether it be one kind of thing or another; and this conclusion is logically contained in Hume's words. It is however clear that Hume did not mean to say that which his words do mean; for he urges against this, which would be entire proof if the thing were not miraculous, the objection that it is miraculous; and this is the whole of the matter that his Essay in effect contains, which, as it has been well remarked, 'confounds the principle of belief with the subject-matter to which it is to be applied.' (Starkie, *On Evidence*, i., p. 473, note.)* This is the case in the first part of Hume's 'Essay on Miracles;' the second part merely professes to show that no miraculous events have ever been established on so full evidence as may amount to entire proof.

Every person understands what is meant by the laws of nature. The material world and the world of thought are subjected to certain general laws, or, to speak more accurately, the phenomena succeed one another in a certain order, which, as far as evidence extends backward, has been generally unaltered. We say, generally, for deviations from this order are alleged to have occurred at various times and in various places. Now deviations from those laws are supposed to present, and indeed do present, events which stagger the belief of many persons, and which are regarded by others as totally untrue. Some have gone so far as to say that such events are impossible; thereby destroying the very ground of all evidence, for we can never determine beforehand the truth or falsehood of the matter offered to be proved; unless indeed the thing asserted and proposed to be proved should be a general proposition, and a man should be able by his own experience to contradict it in one or more particular instances: in such case, a man might beforehand deny the thing proposed to be proved. This is in fact Tillotson's argument against the real presence, which Hume 'flattered himself' was of 'a like nature' with the argument that he 'had discovered.'

Hume's definition of a miracle, at least the first part of it, appears unobjectionable: it is defined by him to be 'a transgression of a law of nature by a particular volition of the Deity, or by the interposition of some invisible agent.'

The true notion of a miraculous event then is an event that was inconsistent with the course of nature, as known at the time when the event is alleged to have taken place, and would be inconsistent with it if it were to take place now; and further, it must be such an event as by the supposition is inconsistent with and cannot take place by virtue of the laws of nature as established. If it is an event that happens by virtue of what is called a law of nature, known or unknown, it is not a miracle as the term is properly understood.

If the raising of Lazarus from the dead was an event which took place by virtue of a pre-established law or course of events, in which this one event, to us an apparent exception, was in fact a necessary consequence of this pre-esta-

* It may not be improper to add, that the writer by no means assents to all the arguments contained in the note referred to.

blished law or course of events, such event is not a miracle, nor such an event as is generally understood by the word miracle. Those then who would bring miracles within what are called the laws of nature, mistake the question. If the event of the raising of Lazarus from the dead, and all the attendant circumstances, took place in the course of things, agreeably to a general law unknown to us, such an event is as much an event consistent with what are called the laws of nature, as the event of any man's death; but in that case, it is not the kind of event which the 'New Testament' presents to us. Whether however it is the one kind of event or the other, matters not as to the evidence of it, which is in no way concerned about the kind or quality of the event.

To take then the case of a man being raised from the dead; can the evidence of such a fact amount to proof? It can amount to proof as strong as that which a man would derive from being an eye-witness of such an event, and having every opportunity of examining it. Whether, in a given instance, the proof is so strong as this, must be ascertained by weighing the evidence, which is quite a different matter from the possibility of such an event being proved, which is all that is here insisted on. Whether the proof, when made as strong as we have supposed, will convince a man, is no longer a matter that in any way belongs to the general question of evidence. The judgment that a man will form on the report of others must be left to himself. As a man must always decide for himself whether he will trust his own senses, so he must also decide whether he can believe that which a credible witness says that he has seen.

There is still another view of the kind of events called miraculous, which is taken by Brown, who thinks that it is not easy to get the better of Hume's sceptical argument, if we admit his definition of a miracle. Brown affirms that a miracle is not a violation of a law of nature, but a new consequent from a new antecedent, the new antecedent being the will of the deity. 'A miracle,' he says, 'is not a violation of the law of nature.' 'In a miracle it is the divine will that, preceding it immediately, is the cause of the extraordinary effect which we term miraculous, and whatever may be the new consequent of the new antecedent, the course of nature is as little violated by it as it was violated by the electrician who for the first time drew lightning from the clouds.' It is sufficient to observe, that as Hume's definition of a miracle admits the existence of the deity, that which he calls a transgression of a law of nature by a particular volition of the deity can be nothing more than a variation by the will of the deity in the phenomena of nature as known to man by his own experience and the evidence of others. Hume's definition then of a miracle does not differ from Brown's account of the matter, except that Brown, while he calls the thing a miracle, denies that it is a violation of the law of nature; and also includes among miracles those events which, whether called miracles or not, are not the same kind of events which Hume and theologians in general call by the name of miracles. Now inasmuch as a law of nature cannot, consistently with Hume's definition, be anything except a certain order in the phenomena which the deity has permitted and permits to take place, and which by the terms of the definition he can vary as and when he pleases,—in this sense, and with reference to the deity, no event can be said to be a violation or transgression of a law of nature, such terms being totally inapplicable to the will of the deity. But inasmuch as the sequence of phenomena as known to man is generally unvaried and regular, any interruption or transgression of such sequence may, with reference to man, be called a violation or transgression of a law of nature, with perfect consistency of language; and by such violation or transgression nothing else can be intended by those who can think with precision, than something which is contradictory to the course of nature as known to man, and not something, as electricity for instance, of which man, up to the time of the proper experiments being instituted, merely had no knowledge, and which, upon further examination, turns out to be perfectly consistent with all man's previous and all his subsequently acquired knowledge of phenomena. After all, it is rather strange that Brown should not have perceived that neither Hume's definition of a miracle, nor his own account of 'the extraordinary effect which we call miraculous,' can vary the event itself, which, by whatever name it is called, remains the same event, simply considered as an event, and is to be proved by precisely the same evidence.

Much has been written on the subject of miracles, both in connection with the general principles of evidence, and by way of reply to Hume's Essay. Though a great deal of it is of little value, it may be worth referring to by those who are desirous of forming clear notions on the subject of evidence.

(Rutherford, *Discourse on Miracles*, 8vo., 1751; *Credibility of Miracles defended*, 8vo., 1751; Adams, *Answer to Hume on Miracles*, 8vo., 1754; Campbell, *Dissertation on Miracles, in Answer to Hume*, 8vo., 1762; Bishop Douglas, *Criterion, &c.*, 8vo., 4th ed., 1832; Locke's *Posthumous Works*, 'Discourse of Miracles;' Bishop Conybeare, *On the Nature, Possibility, and Certainty of Miracles*, 8vo., 1722; Chubb, 'Discourse on Miracles,' in his *Miscellaneous Works*; Lardner's *Credibility*; Middleton, *Free Enquiry*; Paley's *Evidences of Christianity*; Price, *On the Nature of Miracles*; Woolston, *Six Discourses on the Miracles of Our Saviour, &c.*, 8vo., 1730; Ray, *Christ's Miracles vindicated*, 8vo., 1731; Bentham, *Rationale of Judicial Evidence*; Brown's *Inquiry into the Relation of Cause and Effect*.)

The above-mentioned works will furnish references to others.

MIRAGE. This word, which is French, has been received into our language. It is the name given to a phenomenon of unusual refraction, for which we have no specific appellative unless it be the sea term *looming*. As a general definition, we may say the mirage is an optical illusion occasioned by the refraction of light through contiguous masses of air of different density, such refraction not unfrequently producing the same sensible effect as direct reflection.

The illusions of the mirage differ according to circumstances, but they may all be arranged under one or other of the three following classes—vertical reflection, horizontal or lateral reflection, and suspension.

In the vertical reflection the mirage presents the appearance of a sheet of water in which objects are reflected, and of course reversed as they would be in a lake. It is this kind which is observed in Egypt, and which so cruelly tantalised the parched throats of the French soldiers during the campaign of Napoleon in that country. The effect of this mirage is thus described by Monge, one of the savans who accompanied the army. The soil of lower Egypt is a vast plain perfectly horizontal; its uniformity is interrupted only by a few eminences on which, in order to secure them from the inundations of the Nile, the villages are built. In the morning and evening the aspect of the country presents nothing remarkable, all objects appearing in their natural positions and at their proper distances; but after the soil has become heated by the presence of the sun, the prospect seems bounded by a general inundation. The villages beyond appear as islands in the midst of a great lake. Under each village its inverted image is seen as it would be if reflected from the surface of a sheet of water. On approaching however, the deceptive inundation recedes, and the reflected image vanishes, to be succeeded by another as some more distant object comes in sight.

This kind of mirage is not peculiar to Egypt; it is known in Persia also, where it is called *Serab* or *Sir-ab* (miraculous water); and it is seen by those who cross the western deserts of India, where it is known by the name of *Tchittram* (picture). Neither is it exclusively confined to inland countries nor low plains. Biot has observed it over the sandy beach of Dunkirk, and it is not unfrequent along the coast of the department of Calvados. The writer of this article has seen it at the Cape of Good Hope. Captain Maundy states, that he observed an effect of the mirage at the Shallout Pass in India. 'A deep precipitous valley below us,' says he, 'at the bottom of which I had seen one or two miserable villages in the morning, bore in the evening a complete resemblance to a beautiful lake. The vapour, which played the part of water, ascending nearly half-way up the sides of the vale, and on its bright surface trees and rocks being distinctly reflected.'

In the horizontal or lateral reflections the mirage presents the reflected image sideways. Thus, on the 17th of September, 1818, Messrs. Jurine and Soret observed a lateral mirage on the lake of Geneva. A bark, about 4000 toises distant, was seen approaching Geneva by the left bank of the lake, and at the same moment there was seen above the water an image of the sails, which, in place of following the direction of the bark, receded from it, and seemed to approach Geneva by the right bank of the lake, the image

sailing from east to west, while the bark was sailing from north to south. This lateral mirage is known to the inhabitants of Merou, who call it *Si-koté* (castle of the cold season); and by such as live in the plains watered by the Chumbul and the Jumna, where it is termed *Dissaser* (prognostic).

Colonel Todd mentions having witnessed this kind of mirage at Jaypoor, Rottah, and Hissar. He describes it as a high dark wall bounding the plain, which, as soon as the sun's rays break in upon it, presents various fantastic forms of ruins, such as, we may imagine from his description, may be not unaptly figured by the natural designs in what is called Florentine marble. Its force of refraction is such, says the Colonel, that it presented to my view the fort and bastions of Agarroa, distant thirteen miles. The natives of Hissar call it *Hertchendraja ka pouri* (the city of the rajah Hertchend), a celebrated prince of the brazen age of Hindustan.

In like manner Dr. Vince, on the 6th August, 1806, at 7 P.M., saw the whole of Dover Castle brought over and placed on the Ramsgate side of a hill situated between the two places and he adds, the image was so strong, that the hill itself could not be seen through it. The French coast is sometimes brought almost in contact with our own by the illusion of the lateral mirage. Thus, on the 26th July, 1798, at Hastings, at 5 P.M., Mr. Latham saw the French coast, which is about 40 or 50 miles distant, as distinctly as through the best glasses. The sailors and fishermen could not at first be persuaded of the reality of the appearance; but as the cliffs gradually appeared more elevated, they were so convinced, that they pointed out and named to Mr. Latham the different places they had been accustomed to visit, such as the bay, the windmill at Boulogne, St. Valery and other places on the coast of Picardy. All these places appeared to them as though they were sailing at a small distance into the harbour. From the eastern cliff Mr. Latham saw at once Dungeness, Dover Cliffs, and the French coast all the way from Calais, Boulogne, on to St. Valery and, as some of the fishermen affirmed, as far as Dieppe. The day was extremely hot, without a breath of wind, and objects at some distance appeared greatly magnified.

In particular situations both the vertical and lateral mirage may be observed together. Thus the late Mr. Blackadder has described some phenomena of both vertical and lateral mirage, as seen at King George's Bastion, Leith, which are very instructive. The extensive bulwark, of which this bastion forms the central part, is formed of huge blocks of hewn sandstone, and from this to the eastern end the phenomena are best seen. To the east of the tower the bulwark is extended in a straight line to the distance of 500 feet. It is eight feet high towards the land, with a footway about two feet broad and three feet from the ground. The parapet is three feet wide at top, and is slightly inclined towards the sea.

When the weather is favourable, the top of the parapet resembles a mirror, or rather a sheet of ice; and if in this state another person stands on it also, but at some distance, with his face turned towards the sea, his image will appear opposite to him, giving the appearance of two persons talking to or saluting each other. If again, when standing on the foot-way and looking in a direction from the tower, another person crosses from the eastern extremity of the bulwark, passing through the water-gate either to or from the sea, there is produced the appearance of two persons moving in opposite directions, constituting what has been termed a lateral mirage: first, one is seen moving past, and then the other in an opposite direction, with some interval between them. In looking over the parapet, distant objects are seen variously modified, the mountains in Fife being converted into immense bridges; and on going to the eastward extremity of the bulwark and directing the eye towards the tower, the latter appears curiously modified, part of it being, as it were, cut off and brought down, so as to form another small and elegant tower in the form of certain sepulchral monuments. At other times it bears an exact resemblance to an antient altar, the fire of which seems to burn with great intensity.

The phenomenon called suspension, which is the third kind of mirage, and is that to which the term looming is most strictly applied, is the picturing of an object immediately over it in the air, frequently without reversion of the image. Sometimes the objects are merely raised above the height at which, under ordinary circumstances, they would appear. Thus Sir R. K. Porter mentions a phenomenon of suspension or looming in the plains near Bagdad. 'A little before morning,' says he, 'I observed an elevated stream of water, which, from its situation, must be the Tigris. Its surface was brilliantly illuminated by the moon, but the longer I kept my eye fixed on this noble river of many interests, the more my surprise became excited at the extraordinary height of its waters above the level of the desert, till at length I began to suspect that some optical illusion from refraction was assisting the apparent elevation of the stream; but I had not conceived the extent of the deception, for as the dawn advanced the phantom river totally sunk from my sight.' The phenomenon of the looming is most generally observed at sea or near the shore. At Reggio the celebrated Fata Morgana is visible, which for many centuries astonished the vulgar and perplexed philosophers. A spectator on an eminence in the city, with his back to the sun and his face to the sea, and when the sun shines from that point whence its incident rays form an angle of about 45° on the sea, sees upon the water numberless series of pilasters, arches, castles well defined, regular columns, lofty towers, superb palaces with balconies and windows, villages and trees, plains with herds and flocks, armies of men on foot and on horseback, all passing rapidly in succession on the surface of the sea. These same objects are, in particular states of the atmosphere, seen in the air, though less vividly; and when the air is hazy and dewy, they are seen vividly coloured or fringed with all the prismatic tints. The image raised by suspension is sometimes reversed: the most remarkable instance of this is perhaps that mentioned by Captain Scoresby, who, in 1822, recognised his father's ship, the Fame, by its inverted image in the air, although the ship itself was below the horizon, and thirty miles off.

It frequently happens that the phenomenon of the vertical mirage is combined with that of suspension, so as to show in the air both a direct and an inverted image of the object, the latter being undermost.

Now all these phenomena and their various modifications depend on the different density of the lower strata of the air, and as this difference of density may be occasioned both by heat and moisture, and as heat may be reverberated from the mountain's side as well as from the horizontal surface of the plains, from the sea as from the land; and further, as contiguous columns of air, as well as horizontal strata, may be of different densities, it is easy to conceive why the mirage may be seen in very different situations, as also why it presents such varied appearances. It will also be evident that any cause which re-establishes the equilibrium of density in the different portions of the air must cause the illusions of the mirage to vanish.

Supposing the nature of refraction to be understood, the explanation of the way in which difference of density in different strata of the air occasions the mirage becomes very simple.

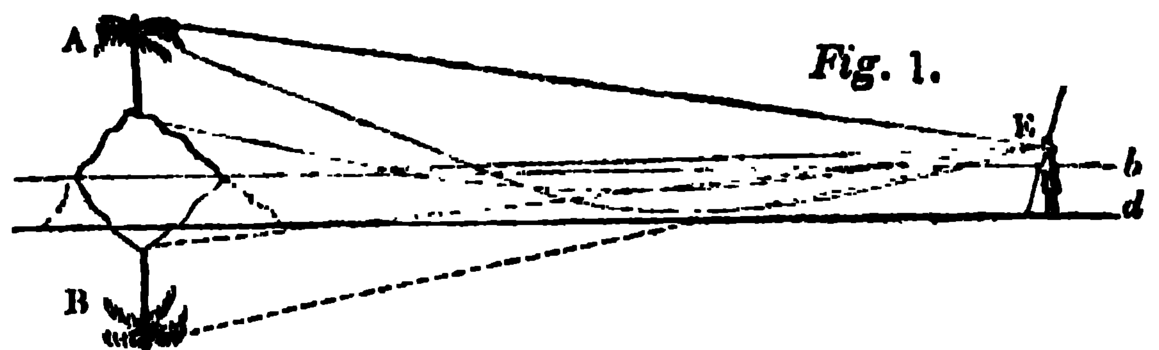


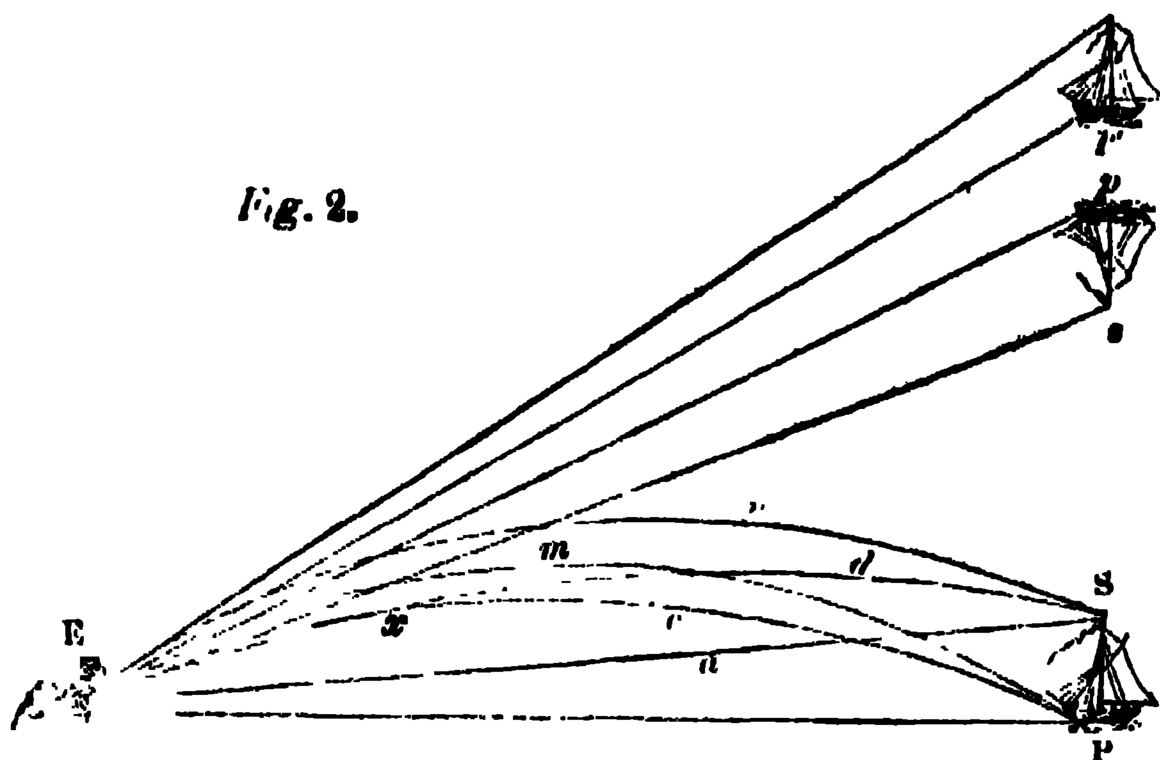
Fig. 1.

Let A represent an object on a hill; *a b c d*, a stratum of air heated by the reverberation from the soil beneath, so as to have a less density than that of the air above. Now if an observer's eye be at E, he will see the object by direct vision in its proper place, and also a reversed image of the same just below it at B, because the rays coming from it obliquely towards the ground are refracted from their direct course on entering the less dense inferior stratum of air, and, taking at first a direction inclining to the horizontal are afterwards bent up so as to meet the eye of the observer at E who thus sees the indirect image in the direction B, or exactly as it would appear if reflected; and moreover as the rays from that part of the heavens which form the background to the object are refracted in the same manner, the sky is reversed as well as the object, and presents the appearance of a sheet of water.

If the lower stratum of air be denser than the strata above, and the object be seen by direct vision through the

denser stratum, then the curve or trajectory, instead of being convex towards the earth, will be concave, and the reversed image will be seen as if suspended in the air above.

Double images, and such are not unfrequent, are explained in this way. Let S P be a ship in the horizon, seen


Fig. 2.

at E by means of rays S E, P E, passing in straight lines through a tract of air of uniform density lying between the ship and the eye. If the air is more rare at c than at a, which it may be from the coldness of the sea below a, its refractive power will be less at c than at a. In this case, rays S d, P c, which, under ordinary circumstances, never could have reached the eye at E, will be bent into curve lines P c, S d; and if the variation of density is such that the uppermost of these rays S d crosses the other at any point x, then S d will be undermost, and will enter the eye E as if it came from the lower end of the object. If E p, E s, are tangents to these curves or rays, at the point where they enter the eye, the part S of the ship will be seen in the direction E s, and the part P in the direction E p; that is, the image S P will be inverted. In like manner other rays S n, P m, may be bent into curves S n E, P m E, which do not cross one another, so that the tangent E s' to the curve or ray S n will still be uppermost, and the tangent E p' undermost. Hence the observer at E will see an erect image of the ship at $s'p'$ above the inverted image sp. It is quite clear that the state of the air may be such as to exhibit only one of these images, and thus these appearances may be all seen when the real ship is beneath the horizon. It is also evident, that if these different densities affect vertical columns of air instead of horizontal strata, the same phenomena may be produced laterally.

All the phenomena known by the names of the *enchanted island*, *Cape Fly-away*, the *flying Dutchman*, &c., are effects and modifications of the mirage.

These unusual refractions were known to the antients, and are well described by them, though they seem not to have understood the rationale of the phenomena. Quintius Curtius (vii. 5), speaking of the desert of Sogdiana, says, 'for the space of 400 stades there is not a drop of water; the violence of the sun's rays in summer kindles such an intense heat in the sand, that everything is burnt up; there also arises such a quantity of exhalations from the overheated earth, that day-light disappears and the plains offer the appearance of a deep and extensive sea."

MIRANDA. Seventeen places of this name are mentioned in Miñano's 'Diccio. Geograf. de la Peninsula.' The following are worth notice:—

In Portugal:—Miranda do Corvo, 4½ leagues south-east from Coimbra, is situated on the Dueça, over which there are two bridges. It contains 3881 inhabitants, or 6298, if we include two parishes that are without the boundaries of the town.

Miranda do Douro (perhaps the Roman Contia or Sepontia Paramica) is the capital of a district of the same name in the north-east part of Tras-os-Montes, a province composed of three other similar divisions, the comarcas of Braganza, Torre de Moncorvo, and Villa Real. It is divided from the Spanish provinces of Zamora and Salamanca by the Douro, on the right bank of which river this city stands. It was destroyed by the barbarians and rebuilt by Alfonso I. in 1136. The population of the city is 7000, and of the comarca 31,700. It is in 41° 22′ N. lat. and 6° 10′ W. long.

In Spain:—Miranda de Arga, situated on the left bank of the river Arga, 5½ leagues south of Pamplona, and 2¼ west of Olite and of Tafalla. The population is 1043. At this place (not at Miranda de Ebro) was born Sancho Carranza, the master of Gines de Sepulveda, and the author of a well known Latin discourse delivered before Leo X., printed at Alcalá, in 1523. It is also the birth-place of Bartholomew Carranza (a nephew, not a brother, of the former), one of the luminaries of the council of Trent. The second dignity in the Roman Catholic church, the Spanish primacy, together with his eminent talents and virtues, which were duly esteemed by Charles V. and the pope, could not save this ornament of the church from the Inquisition, which, after keeping him prisoner in Spain and at Rome, wrung an abjuration from this old man in his seventy-second year, and confined him in the Dominican convent of his order, La Minerva, where he soon died.

Miranda de Ebro (Mirocca, Miranda Iberica, Deobriga) is intersected by the Ebro, the two principal parishes being on the right and a third on the left bank. It is 14 leagues south of Bilboa, and 64 north of Madrid. This town is beautifully and conveniently situated on the chief north road of Spain, and within the frontier of Old Castile. Travellers who come from the free Basque Provinces are examined here, and their goods are subject to the payment of duties. Here also begins the fine road which extends to Guipuzcoa, the expense of which was defrayed by the province of Alava. This town has a strong bridge of six arches over the river, and a fine square, with fountains. The surrounding country is very picturesque and fertile. It abounds in secondary limestone. The population is 2390. It is not this, but another Miranda de Duero (Douro, in Portuguese), 3 leagues from Soria, which gave birth to the cardinal Iñigo Lopez de Mendoza y Zuñiga, archbishop of Burgos, ambassador to England and Naples, and the biographer of the above-mentioned Sancho Carranza. There is also a Miranda in the kingdom of Naples, in the province of Sannio, one league and a half north-east of Isernia.

MIRANDA, SA DE, one of the earliest poets of Portugal, and one of the chief founders of Portuguese literature, was born at Coimbra about the year 1495. He was of a noble family, and being intended by his father for the legal profession, was educated accordingly, and became professor of law in the university of his native town. Having however no inclination for such studies, upon the death of his father he resigned his appointment, and visited Spain and Italy, chiefly for the purpose of studying the languages and literature of those countries. On his return to Lisbon he obtained an appointment at court, where he was regarded with much esteem, but was afterwards obliged to retire to his country seat of Tapada, near Ponte de Lima, in the province of Entre Douro y Minho, in consequence of some unpleasant affair in which he involved himself. In this seclusion, so well suited to his melancholy turn of mind, he devoted the remainder of his days to rural enjoyment, to his literary studies and occupations, and to music, of which he is said to have been passionately fond. It was also his good fortune to have for the companion of his retirement a wife to whom he was tenderly attached, although she was neither very young nor very beautiful when he married her. In 1553 he had the misfortune to lose his son, who was killed in Africa, and whose death he has bewailed in an elegiac composition of a strong devotional cast. His own death happened in 1558, and was an event that excited general regret. Sa de Miranda has been styled the poet of reason and virtue; and it has been said of him that he was a philosopher in poetry and a poet in philosophy. Yet greatly as the literature of his country is indebted to him (and he was the first to adopt the metres of Dante and Petrarch), few of his productions are of a class to interest the modern reader. Except as specimens of language and versification, frigid eclogues and detached thoughts in the form of sonnets—not many of which are of striking merit—possess scanty attraction at present, for they have not even historic value as portraying the manners and sentiments of their own age. A considerable number of his compositions, and among them some of his best, are written in Spanish, a fashion in which he had afterwards many imitators, greatly to the prejudice of the native literature. As a dramatist, again, he not only imitated those of Italy, Macchiavelli and Ariosto, but laid his scenes in that country, and described Italian manners and characters. This however is of less consequence, as neither of his two pieces, 'Os Estrangeiros,' and 'Os Vilhalpandos,' (and he produced no others,) shows much dramatic skill in contrivance, or comic power in execution. What is chiefly remarkable in them is the freedom with which the dissolute morals of the Italian

clergy are delineated by one who was himself a rigorous Catholic. His *Cartas*, or poetical epistles, are of far greater intrinsic value than any of his other productions, and are interesting as records of the state of morals and manners in Portugal in the first half of the fifteenth century. They also throw some light on the poet's personal character, and show him to have been of a good disposition and a sincere well-wisher to his countrymen.

MIRANDA, FRANCISCO, the founder of the independence of Spanish America, was born about the middle of the last century, at the city of Caracas, of which province his grandfather had been governor. He travelled on foot at the age of twenty through various parts of the New Continent. He afterwards became a colonel in the Spanish army, and was entrusted occasionally with important matters by the governor of Guatemala. In 1783 he visited the United States, and afterwards travelled on foot through England, France, Italy, and Spain, a country which he detested. Even at that time he ventured to speak of the emancipation of his own country to Pitt and to Catherine II., who treated him with great regard, especially the empress, who entreated him to enter into her service; but the high expectations of the French revolution, being far more congenial to his own, drew Miranda from Petersburg to Paris in 1790. He was warmly welcomed there by Péthion, to whom he was recommended by the leaders of the opposition in the English parliament, and in consideration of this recommendation, as well as of his military talents and enthusiasm for the popular cause, he was appointed major-general to Dumouriez, who was sent against the Prussians, then intent on putting down the French cause lest it should become a European question. But unfortunately Miranda did not answer the expectations of his new friends, either in raising the siege of Maastricht, on account of General Valance not coming to his assistance, nor at the battle of Neerwinde, where the left wing of the army was defeated, a reverse which Dumouriez imputed to Miranda. This charge however he most ably and triumphantly refuted, with the assistance of Tronçon Ducoudrai, before the revolutionary tribunal, which sat eleven days on this case, and, greatly to their credit, acquitted an innocent foreigner whose life was demanded by humiliated national pride, and who was then bereft of all patronage, since the Girondists were no more. Being again seized and condemned by the Directory on the 18th Fructidor, Miranda escaped, and came as a refugee to England. He returned to Paris in 1803, whence he was banished, a second time, by Bonaparte. Finally, he devoted himself exclusively to his country's independence. He sailed from New York, in 1806, with a ship and some volunteers, and touched at St. Domingo, where he chartered two schooners, which were captured by Spanish cruisers (*guarda costas*). He himself escaped with his ship, and landed at Venezuela in the month of August. He sustained however a complete defeat, which prostrated the American cause till 1810. The supreme junta of Caracas for a moment roused the Spanish Americans again in favour of Ferdinand, who was then a captive of Napoleon, and subsequently against Napoleon's sway, April 9, 1811. But the cause of independence went on prosperously till the same day of the following year (1812), when a tremendous earthquake destroyed 20,000 persons in Caracas, La Guayra, and Merida. The clergy took advantage of the calamity, and stigmatised the patriots as enemies to God, whose anger they had provoked by their rebellion. This fanatical outcry worked on the terror of the people, which was already great, and gave the Spanish army a complete triumph. General Miranda was forced to surrender, but he surrendered last of all, and not without honour. But a hard fate still awaited him; for, when he was about to leave the country, he was arrested by some of the officers of the independent party, and accused by Bolivar of being a traitor, and a secret ally of the British cabinet. Such a charge was strange indeed (if it does not provoke a heavier censure) at a time when both British interests and sympathies so effectually coalesced, in spite of diplomatic professions, in forwarding the emancipation of the Spanish colonies. The assistance and the money which it was alleged that Miranda had derived from English officers and friends, ought to have endeared him to all his countrymen whom envy had not debased. Nor should it be forgotten that Bolivar obtained a safe conduct to retire to Curaçao from the Spanish general Monteverde, to whom he delivered his prisoner Miranda. Monteverde, instead of protecting a man who was the victim of jealousy and envy, violated his agreement with Miranda, and sent him in chains to Spain. He was lodged in the prison of the restored Inquisition at Cadiz, till 1816, when death released from his sufferings this most unfortunate veteran and martyr of American freedom.

MIRANDE. [GERS.]

MIRA'NDOLA. [MODENA; PICA DELLA MIRANDOLA.]

MIRECOURT. [VOSGES.]

MIRE-CROW, a name for the Laughing Gull. [LARIDÆ, vol. xiii., p. 335.]

MIRE-DRUM, a name for the BITTERN.

MIREPOIX. [ARRIEGE.]

MIREVELT, MICHAEL JANSEN, born at Delft in Holland, in 1568, was one of the ablest and most successful painters of the Dutch school. He was a disciple of Abraham Blockland, and at the beginning of his professional career painted historical subjects. Finding however a great demand for portraits, he was induced, as many other artists have been, to abandon the higher but less advantageous department of the art for the more lucrative branch of portrait-painting, in which he acquired such extensive reputation, that he was invited by King Charles I. to visit his court; but as the plague was raging at that time in London, he was deterred from accepting so advantageous an offer. His portraits were esteemed for the extraordinary accuracy of the likeness, for good taste, high finish, and great freedom of pencil. The esteem in which he was held and the extent of his practice are proved by the number of portraits which he painted, which Houbraken states to have been five thousand; Sandrart, and after him Descamps, and the 'Abrégé de la Vie des Peintres,' say ten thousand, which is quite incredible, though Sandrart indeed makes him to have lived to the age of ninety, whereas all other writers agree that he died at the age of seventy-three, in 1641, in the town of Delft, which he had never quitted, except occasionally to visit the Hague, to paint the portraits of some of the princes of the house of Nassau, by whom he was highly esteemed. He must have made a large fortune, for he never received less for his smallest pictures than 150 florins (15*l.*), and more in proportion for those of a larger size.

MIROUNGA, Mr. Gray's name for a genus of *Seals* [PHOCIDÆ.]

MIRROR (from the French *miroir*), any polished surface which reflects light so as to form an image. The mathematical theory will be found under SPECULUM.

MISCHNA. [MISHNA.]

MISDEMEANOR is a term applied in the law of England to crimes and offences, whether of commission or of omission, less than felony. [FELONY.]

At common law, persons convicted upon an indictment [INDICTMENT] for a misdemeanor are punishable by such fine, or by such term of imprisonment short of imprisonment for life, or by such amount both of fine and imprisonment, as the court before which the offenders are convicted, in its discretion awards. By several statutes special modes of punishment are provided for some particular misdemeanors. But it frequently happens that even in creating new misdemeanors, the legislature affixes no particular punishment. In such cases, the newly constituted offence is punishable as a misdemeanor at common law. Generally, wherever a statute prohibits an act, as a matter of public grievance, or commands an act, as a matter of public convenience, all things done or omitted contrary to the prohibition or command are punishable as misdemeanors at common law; it being a common-law offence to disobey a statute, even though the act or omission be not attributable to a corrupt motive. Where a statute, in respect of an offence which was a misdemeanor at common law, provides a mode of proceeding different from that of the ordinary course by indictment, either the extraordinary or the ordinary mode may be adopted. Thus if a statute give authority to the court of quarter-sessions to make an order respecting some particular matter, and prescribes a particular remedy in case of disobedience, a party disobeying an order made in pursuance of the statute may be proceeded against either in the mode prescribed by the statute or by indictment. He would be guilty of a misdemeanor at common-law, both as having disobeyed a public statute, and as having disobeyed an order made by a court having authority to make such order. Where however a statute has made a matter a felony which before was a misdemeanor only, the offender cannot be indicted for the misdemeanor, as the minor or lower offence is said to be merged, that is, drowned or absorbed, in the higher. [MISPRISION.] Where a statute creates a new offence, by making unlawful

that which was lawful before, and appoints a summary mode of proceeding, the specific statutory course must be pursued, and an indictment will not lie. An act done in contravention of a statute which extends only to private persons, or relates to disputes of a private nature, cannot be made the subject of an indictment; for no injuries of a mere private nature not in any degree concerning the king, and not accompanied by a breach of the peace, can be made the subject of a criminal prosecution. Nor will an indictment lie for an infraction of the bye-law of a corporation. But under some circumstances an indictment will lie for a personal injury, where the act or omission amounts to a violation of duties incumbent on the party as a member of civil society, as in the case of a parent wilfully omitting to supply proper food to an infant unable to provide for itself. Where a child is put out apprentice by an order of magistrates, the master, if he refuse to provide for the child, may be indicted for disobedience of such order. Any act of wilful negligence, whereby human life is endangered, is a misdemeanor; as to put on board a ship a package containing gunpowder, oil of vitriol (sulphuric acid), or other dangerous articles without giving notice of the contents of the package, so as to enable the master of the vessel to use proper precautions in stowing it. Every act done for the purpose of committing either a felony or a misdemeanor, is itself a misdemeanor.

As to the course of proceeding upon indictments for misdemeanors, see TRAVERSE.

Where a peer or a commoner is impeached by the House of Commons for a misdemeanor, the lords spiritual as well as the lords temporal are judges. The judgment is pronounced by the lord chancellor, and it is binding though the king dissent from such judgment; whereas in capital cases the royal assent is necessary, and the judgment is pronounced by the lord-high-steward. [STEWARD.]

MISE'NUM. [NAPLES.]

MISHNA. [HEBREW LANGUAGE.]

MI'SILUS, a genus of *Foraminifera*.

MISITRA, or MISTRA. [LACONICA; SPARTA.]

MISPRISION (from *mesprendre*, which means sometimes to deal improperly with, sometimes to treat with contempt), is a term used in English law in different senses.

I. In the sense of criminal nonfeasance, or neglect to perform important public duties, the term is applied to concealment of treason or felony. Misprision of treason consists in a party's withholding his knowledge of a treason committed or about to be committed, or in omitting to give information respecting it within a reasonable time to some public authority. If the concealment or omission to reveal the treason be accompanied by express assent to the treasonable act or purpose, or by any circumstances from which a tacit assent will be implied, the party is guilty of high treason, as well as of misprision of treason; and the crown may prosecute either for the higher or the lower offence. Misprision of treason is a misdemeanor [MISDEMEANOR], punishable by imprisonment for life and the forfeiture of the personal property of the offender absolutely, and of the rents and profits of his real property for life.

Misprision of felony is a similar concealment in respect of felonies, and it is punishable by fine and imprisonment. In some, if not in all cases of felony, the party may be proceeded against for the minor offence, or misdemeanor, although a felony has actually been committed by him.

The concealment of treasure-trove [TREASURE-TROVE] is another species of criminal neglect, which constitutes a misprision punishable by fine and imprisonment.

II. Misprision by malfeasance, (by doing something which ought not to be done,) is the commission of such misdemeanors as are construed to involve a contempt of the royal authority or prerogative. Maladministration in high offices of public trust, though indictable as a misprision, is commonly, on account of its importance, made the subject of parliamentary impeachment.

It is a contempt of the prerogative to refuse to assist the king when called upon, either in his councils by advice, or in his wars by personal service within the realm in cases of invasion or rebellion; to refuse to join the posse comitatus, or power of the county, when duly required by the sheriff or justices; to accept a pension from a foreign potentate without the consent of the king; to go abroad when forbidden so to do either by writ of ne exeat regno, or by a general proclamation, or to neglect to return from abroad when commanded by the king's letters; to disobey an act of parliament where no particular penalty is enacted; to speak or write against the king's person or government, or do any thing tending to lessen him in the estimation of his subjects; to weaken his government, or to raise jealousies between him and his people; to deny the king's title to the crown in common unadvised speech [PRÆMUNIRE]; to use threatening or reproachful words to a judge in court; to assault or threaten the adverse party in a suit, or his counsel or attorney, or a juror for his verdict, or a gaoler or other officer for exceeding his duty; to commit an affray near the courts of Westminster Hall, or at the assizes, but out of the view of the judges; to dissuade a witness from giving his evidence; to advise a person to stand mute; to disclose an examination before the privy-council or a grand-jury. All these are positive misprisions or contempts, punishable by fine and imprisonment. Maliciously striking in the palace in which the king resides, whereby blood is drawn, is punishable by fine, forfeiture, imprisonment, and loss of the offender's right hand. Rescuing a person from the custody of one of the superior courts of justice, in Westminster Hall, or at the assizes, is punishable by imprisonment for life, forfeiture of personal property, and forfeiture of the rents and profits of real property during life. A stroke or blow given in any of these courts, whether blood be drawn or not, or an assault upon a judge whilst he is sitting in court, by drawing a weapon, though no blow be struck, subjects a person to the same penalties as those last mentioned, and also to the additional punishment of loss of the right hand.

The misprision which is stated above to be included in the actual commission of treason or felony, may be referred to this second division, as it consists in mal-feasance rather than in non-feasance. There is also one species of misprision of treason by malfeasance, created by act of parliament. The 13th Eliz., cap. 2, enacts that those who forge foreign coin, their aiders, &c., shall be deemed guilty of misprision of treason. (3 Blackst. *Comm.*, 119.)

III. The term misprision is also applied to careless but involuntary mistakes, or, as they would now be called, clerical errors, particularly those committed by public officers in entering the proceedings in a cause or in a judicial proceeding upon the rolls or records of the court; though it is also applied to misrecitals and mistakes in deeds, &c. (Roll. *Abr.*, 'Grant.')

MISSAL (from the Latin *missa*), the book or ritual containing the several masses to be used on particular days or feasts.

The Roman missal was originally compiled by Pope Gelasius, and afterwards reduced into better order by Gregory the Great, who called it the Book of Sacraments. The 'Missale Romanum, ex decreto Concilii Tridentini restitutum,' is that at present in use. We have an edition before us, printed at Rome, in folio, 1826.

Antiently, each diocese, and each order of Religious, where they chose, had their particular Missal, accommodated to the festivals of the province or order. Such were the 'Directorium Missæ Ecclesiæ Moguntinensis;' the 'Missale Ecclesiæ Herbipolensis,' fol., Herbip., 1484; the 'Missale secundum rubricum Archiepiscopatus Ecclesiæ Pragensis,' fol., Norimb., 1508; and such in England were the Missals of the churches of Hereford, York, and Sarum, the last of which continued to be printed as late as 1557. Among the Missals prepared for the orders of the Religious may be named, the 'Missale secundum ritum et ordinem sacri Ordinis Præmonstratensis, authoritate Joan de Pruetis, Abbatis Præmonstratensis, auctum et editum,' fol., Par., 1578; and the 'Missæ propriæ Sanctorum trium Ordinum Fratrum Minorum ad formam Missalis Romani redactæ, et exactius examinatæ; additis Missis à sacra Rituum Congregatione noviter concessis et approbatis,' fol., Ven., 1700.

We have also the 'Missale Illyricum,' 4to., Ven., 1528; the 'Missale Chaldaicum, juxta ritum Ecclesiæ Maronitarum,' fol., Rom., 1592; and the 'Codex Mysterii Missæ Armenorum, seu Liturgia Armena,' *Lat. et Armen.*, fol. Rom. 1677.

The Missals of the thirteenth, fourteenth, and fifteenth centuries, written previous to the discovery of the art of printing, present us, in many instances, with the finest specimens of illumination now preserved in our libraries.

MISSEL-THRUSH. [THRUSH; MERULIDÆ.]

MISSELTOE, a parasitical plant found wild in this country, is the Viscum album of botanists, and is in many respects a production of great interest to the physiologist. Instead of describing so very common a plant as this is,

we shall advert to some of the more striking facts connected with it. The seeds in germination seem to offer an exception to a general law, that the radicle of the embryo shoots downwards, and the plumula upwards; for it is found that the radicle of the misseltoe invariably turns itself down upon the body to which it is attached, whatever may be the position of the surface of that body with respect to the earth. For instance, if a cannon ball, to which misseltoe seeds are glued on all sides, be suspended by a cord some distance from the earth, both the upper and under seeds, as well as those at the sides, all direct their radicle to the surface of the ball. This property ensures their growing upon the branches of trees, to whatever side they may happen to stick. According to Dutrochet, they owe this property to a tendency on the part of the radicle of the misseltoe to avoid light; he attached seeds to the inside of a square of glass in a window, and the radicles were all directed to the interior of the apartment; he then glued others upon the outside of the squares, and they turned their radicles down upon the glass, thus directing themselves towards the dark interior; and other experiments were tried with the same result.

In fixing itself upon a branch, the embryo of the missel, too curves its radicle down upon the bark, and then adheres firmly to it, and it is a twelvemonth before the plumula begins to extend; this may be to give the radicle time to pierce the bark and introduce itself below the liber, where it expands and acts the part of a root by attracting thence the fluids which are necessary for the support of the parasite.

It is not a little remarkable that in the structure of its ovary this plant, and others of its order, should offer the singular fact of the ovule not existing at the time of impregnation, nor appearing till from six weeks to two months later; at present no explanation has been offered of this very unintelligible circumstance.

The fruit, which is covered with a viscid pulp, is made by the Italians, and even in Herefordshire, into a kind of birdlime; and as it is a favourite food of the large or *missel* thrush, it is thought to have given rise to the proverb, 'Turdus malum sibi cacat.'

The plant is not of any known use to man, and is of popular interest chiefly as having been connected with Druidical superstitions. The misseltoe of the Druids was exclusively that found upon the oak, and was possibly so much valued because of its rarity; for its appearance on that tree is now so rare, that many persons have believed the Druids' misseltoe either to have been some other plant or to have had no real existence. But it has lately been found on more than one oak-tree in Herefordshire, and it is probable that it was plentiful in the oak woods of Snowdon before the damp western parts of Britain were disforested. A good account of the misseltoe will be found in Loudon's *Arboretum Britannicum*, vol. ii., p. 1021.

MISSIONS. The 15th verse of the 16th chapter of *Mark* is the great scriptural authority for missions. In the sixth century (590-604) Pope Gregory the Great sent missionaries to Britain, to convert the people to the Christian faith. Similar means were adopted in other countries, until, about the close of the tenth century, when the Christian religion had become the prevailing faith throughout Europe. Other fields for missionary exertion were then sought. Attempts were made to propagate Christianity in Tartary and China; and the Portuguese, who visited Abyssinia about 1490, endeavoured to bring over the Christians of that country to the Catholic faith. The history of this mission may be seen in Mosheim's 'Ecclesiastical History.' [ABYSSINIA; ALVAREZ; LOBO.]

With the earliest maritime discoveries of the Portuguese the desire for the conversion of heathen people was excited with renewed zeal, and may even be said to have been instrumental in stimulating the passion for maritime expeditions. About 1430 Pope Martin V. granted plenary indulgence to the Portuguese who conquered pagan and infidel countries. Columbus himself was strongly urged to discovery by the desire of propagating the Roman Catholic religion.

Modern missions may be said to have commenced at the same period with these discoveries, in which the popes took great interest. On the return of Columbus to Spain from his first voyage, the results were formally announced to Pope Alexander VI.

The work of converting heathen people was at first undertaken in a barbarous spirit. The commanders of the expeditions which Don Henry of Portugal sent out in the fifteenth century had 'orders to convert the natives of the coast of Africa to Christianity;' and nominal conversions were often effected by the sword.

In 1484 Diego Cam brought four natives of Africa to the court of Portugal; they were sent back with presents and a message to their sovereign, desiring him to embrace Christianity. The natives whom Columbus brought to Spain were baptised, the king and the prince his son acting as sponsors. In his second voyage to the new world, Columbus was accompanied by priests with church vessels and ornaments, and they received orders to bring the natives within the pale of the church by 'fair means.'

The conduct of Cortes in Mexico is an example of the spirit in which conversion was attempted in the New World. Having cast down and destroyed the altars in one of the Mexican temples, a new altar was erected, which was hung with rich mantles and adorned with flowers. Cortes then ordered four of the native priests to cut off their hair and to put on white robes, and placing the cross upon the altar, he committed it to their charge. They were taught to make wax-candles, and Cortes enjoined them to keep some of the candles always burning on the altar. A lame old soldier was left by Cortes to reside in the temple, to keep the native priests to their new duties. The church thus constituted was called the first Christian church in New Spain. Father Almedo, who accompanied Cortes in his expedition, explained to the Mexicans the 'mystery of the cross.' He then showed them an image of the Virgin, and told them to adore it, and to put up crosses in their temples instead of their accursed images. When the Mexicans began to feel the power of Cortes, some of the chiefs conciliated his favour by presents. Twenty native women were presented to him, who were baptised by one of the ecclesiastics, and Cortes gave one to each of his captains. 'These were the first Christian women in New Spain.' The natives both of India and the New World soon perceived that one of the means of conciliating their conquerors was to make a profession of Christianity. In Hispaniola, many natives did this in order to oblige and conciliate Columbus. In 1538, Andrea Galvano, governor of the Molucca islands, sent a ship commanded by Francis de Castro towards the north, 'with orders to convert as many as he could to the Christian faith.' Castro himself baptised many of the principal chiefs of Amboyna. Many similar facts might be adduced to show that at this period true religion made little or no progress in newly discovered countries; and yet during the sixteenth century not a fleet sailed for India or America without its missionaries.

The stream of missionary enterprise was at length directed and regulated by different religious orders and distinct institutions. One of the objects of the Society of Jesuits, established in 1540, was the extension of the Roman Catholic faith, and the Jesuits soon became the most active and energetic missionaries to heathen countries. Their activity roused the zeal of the Franciscans, Dominicans, and other orders, and early in the seventeenth century institutions were founded with a view of rendering the labours of missionaries more effective by a preparatory course of training. In 1622, Pope Gregory XV. founded at Rome the 'College de Propaganda Fide,' which was soon richly endowed. Pope Urban VIII. was one of its principal benefactors. This college consisted of 13 cardinals, 2 priests, 1 monk, and a secretary. It sent out large numbers of missionaries to aid the propagation of the Catholic faith in all parts of the world; published books to facilitate the study of languages; distributed works of piety among various nations in their own language; and maintained in various institutions young men intended for foreign missions. To the above institution was added the 'College or Seminary for the Propagation of the Faith,' founded by Pope Urban VIII. in 1627, which became the central institution in which missionaries were prepared. This establishment was endowed by a Spanish nobleman, who presented his palace and all his possessions to the pope for the purpose. His liberality had soon many followers. Numerous institutions of a similar character were soon after founded in France. The 'Congregation of Priests of the Foreign Missions' was instituted by royal authority, and about the same time the 'Parisian Seminary for Foreign Missions' was established by an association of bishops and other ecclesiastics, for the education of foreign missionaries. The 'Congregation of the Holy Sacrament,'

also a French establishment, was another of these institutions. These establishments were under the authority of the 'De Propaganda' of Rome. Henry III. of France took considerable interest in foreign missions, and Henry IV. and Louis XIII. assigned funds for their support. Private associations were also formed in France, in the time of Richelieu, for sending missionaries to Canada, which were joined by many persons of rank and distinction. The Jesuits first visited Canada in 1608. In 1700, at the desire of Louis XIV., they endeavoured to propagate Christianity among the natives on the banks of the Mississippi. Towards the close of the seventeenth century there were not fewer than eighty seminaries in different parts of Europe which prepared and sent out missionaries. The Jesuits, Dominicans, Franciscans, and Capuchins were the most active in these undertakings, which were conducted on a large scale and with a regularity and combination of means altogether superior to the efforts made immediately after the discovery of America and of the path to India round the Cape of Good Hope.

India, Japan, and China were the principal fields of exertion. Xavier, who was canonized by Urban VIII. under the title of the 'Apostle of the Indies,' proceeded to India at the request of John III., king of Portugal, for the purpose of extending the Christian religion in that quarter, the king being disappointed with the little progress which it had made. Xavier was a man of superior genius and laboured with unexampled energy. Having preached the faith with considerable success at Goa, on the coast of Comorin, at Malacca, in the Moluccas, and in Japan, he died in 1552, on the frontiers of China. In Japan, where Xavier was succeeded by missionaries from Portugal, great numbers made a profession of Christianity: in 1596 the converts were estimated at 400,000. The exercise of practical charity, which was inculcated by the Christians, is said to have been the main cause of this success; the native priests let the sick and needy die of neglect and starvation. After an existence of nearly a century, the protection which the Christian religion had received from the rulers of Japan was withdrawn, and a cruel and bloody persecution commenced, which the native Christians endured with a spirit worthy of the early martyrs. This disastrous termination of the mission has been attributed to the intrigues of the Dutch, who wished to possess themselves of the commercial privileges enjoyed in Japan by the Portuguese. Puffendorf, in his 'History of Europe,' says that a letter or pretended letter of the Jesuits was shown to the emperor of Japan, in which they had promised the pope to bring Japan under his authority. Since this period no successful missionary operations have been caried on in Japan. (Charlevoix, *Progrès et de la Décadence du Christianisme dans l'Empire du Japon*, Rouen, 1715.)

China was, for a long time, a scene of successful missionary exertion under the direction of the Jesuits. Father Roger, a missionary of this order, first preached the gospel in China, in 1581. Matthew Ricci, an Italian Jesuit, was the first missionary who obtained an introduction to the court, and is justly regarded as the founder of the Chinese mission. Ricci proceeded to China in 1583, but he was not introduced to the emperor until 1601, when he presented to him a picture of Christ and another of the Virgin, and obtained permission to preach. Individuals were chosen for this mission on account of their scientific acquirements, and it was Ricci's mathematical attainments which rendered him acceptable to the emperor and the court. The empress consented that several ladies of the court should receive instruction in the Christian religion, and some of them were afterwards baptised. Adam Schaal, another of the missionaries, was employed to reform the Chinese calendar and their system of astronomy. Shortly afterwards two handsome churches were erected at Pekin with the permission and under the protection of the emperor. Under these favourable circumstances Christianity made considerable progress. In 1664 the missionaries were fearful of a persecution, but the storm passed over, and the people were forbidden to disturb the Christian converts or to profane their churches; but in the succeeding year their fears were confirmed, and 3 Dominicans, 1 Franciscan, and 21 Jesuits were banished to Canton, only four of the missionaries being allowed to remain at court. A few years afterwards the missionaries regained the favour of the emperor, and Father Verbiest was appointed president of the Tribunal of Mathematics, and for five months gave lessons to the emperor in the mathematical sciences. An assembly of mandarins decided that the Christian religion taught nothing that was evil or that tended to sedition; but the erection of new churches was forbidden, and the Chinese were warned not to desert their antient faith. Notwithstanding this, it is stated that in this year 20,000 Chinese were baptised. In 1685, five French missionaries arrived at Pekin, with the title of 'mathematicians of Louis XIV.' One of them attended the emperor when he travelled, and three of them translated and explained to him lessons in the sciences twice a-day. In 1692 the missionaries obtained from the emperor a more favourable edict for their religion. He also granted them a site for the erection of a house and church within the walls of the palace, giving them building materials, and appointing mandarins to superintend the work. The church was consecrated and opened in 1702. In 1710, a cardinal legate was sent by the pope to settle differences which had arisen amongst the members of the mission, but he died at Macao, and his successor did not reach China until 1721, when he was honourably received by the emperor, with whom he had several interviews. In 1717 however the missionaries had been again accused of seditious designs, and the emperor confirmed a decree prohibiting the building of churches, and Europeans were in future only allowed to remain in China on condition of their promising never to return to Europe. In 1723 the throne was filled by an emperor who at first was rather favourably disposed towards the missionaries, but he afterwards issued an edict under which they were driven from the churches and only tolerated at Pekin and Canton. Duhalde, on whose authority the above statements are given, says that above 300 churches and more than 300,000 Christian converts were deprived of religious instruction by this act. Several families of rank were degraded or exiled by the emperor on account of professing Christianity. In 1732 the missionaries, thirty in number, were banished to Macao, having from motives of conscience disobeyed the edict which forbade the propagation of the Christian religion. Converts were at this period kept together by native catechists, and a few of the missionaries remained in China in concealment, or re-entered the country by stealth. The mission is still carried on, in spite of the occasional attempts of the government to put it down. The years 1805, 1811, and 1815 were years in which the Christians were actively persecuted. In 1810, 23 missionaries and 80 native agents were engaged in China, and the number of native Christians was 215,000. In 1820 a European missionary was strangled in the provinces by order of the government. At present there are Catholic communities in all the provinces, where service is performed by native priests. The Catholic community of Pekin amounts to 26,000 members. In the province of Sze-chuen, Christians are interred in the churchyards, and the cross is planted at the head of the dead. If a native clergy can be formed, greater toleration may be expected, as Christianity is chiefly objectionable as an instrument of European influence. The local authorities, having once tolerated a community, are interested in preventing the circumstance being known in higher quarters. (Medhurst's *China*, 1838.)

In November, 1836, a violent decree was issued against the missionaries and Christians of the Fo-Kien mission; the churches were closed, and safety was sought in flight; but the decree was not a general edict, and was issued only by the provincial governor. In August, 1837, several Catholic churches were destroyed in Cochin-China, and some of the Christians were executed, among whom was a French missionary. The college of St. Joseph at Macao is for the education of Chinese students. The number of missionaries who proceed to the interior from Macao is considerable in every year. Notice is given to their adherents on the route, and at length they arrive by stealth at their destination, where they often live in great seclusion, the converts coming to them secretly for instruction. In some parts the worship is conducted openly. In 1836 a new church was opened at Pekin. Mr. Medhurst was informed by a commercial gentleman that the different superiors of the missions in Macao negotiate bills in Europe to the amount of 40,000*l.* annually. Dr. Milne, the coadjutor of Dr. Morrison in China, speaking of the Catholic missionaries, has eulogised the 'learning, personal virtues, and ardent zeal' of many of them. They translated the greater part of the New Testament into Chinese, and promoted a knowledge of science and the arts. The Catholic missionaries in China at the present day are far inferior to their predecessors.

In the seventeenth century the Jesuits sent many missionaries to the East Indies, to Tonquin, Bengal, Madura, the coast of Coromandel, and to Surat. In the course of fifteen or sixteen years above eighty missionaries were sent to those countries, of whom some were shipwrecked, and others died on the voyage, and from the effects of hardships and difference of climate. The East India mission had many attractions for the ardent missionary, and it was represented that one individual might calculate upon converting from five to six hundred of the heathen yearly. In the Madura mission it was stated that each missionary baptised every year at least a thousand converts. The manner in which the missionaries of this period endeavoured to add to the number of converts has been often censured. The compulsory and barbarous system of the early Spanish and Portuguese commanders was said to be in some instances exchanged for more subtle though still unscrupulous and unjustifiable means. The missionaries were accused of corrupting the purity of the Christian doctrine; and the moral system which they substituted for that of the natives did as little violence as possible to rooted prejudices. In India it was alleged that converts to Christianity were permitted to exercise the least objectionable rites of their former faith; but this licence was not sanctioned by the church. Respect was so far paid to the prejudices of the Hindus as to appoint separate missionaries to exercise their calling amongst the Pariahs. One of the Jesuits, in order to promote the success of his mission, is said to have assumed the character of a Brahmin, and produced a piece of parchment containing forgeries professing to prove that the Brahmins of Europe were more antient than those of India, and that the Jesuits of Rome were lineally descended from the god Brama. Many similar statements have been made, which are doubtless somewhat exaggerated. (Juvenci, *Histoire des Jesuites;* and Vorbert, *Mém. Hist. sur les Missions des Malab.* Also *The Missionaries' Arts discovered*, London, 1687; and on the other side, *Défense des Missionaries de la Chine, &c.*, Paris, 1688.)

It is somewhat difficult to form a just estimate of the labours of the Jesuits in America. Some writers are favourable and others unfavourable to them. It may perhaps be said with truth that the Jesuit missions to America did little to develop the energy and good qualities of the natives, although in Paraguay, and in Upper and Lower California, the missionaries were in possession of all the resources of the country, and enjoyed the extraordinary power which these circumstances conferred. In California the country was left almost entirely in their hands, and they soon acquired a dominion as complete as in Paraguay; but, whether from ignorance of human nature or the unfitness of ecclesiastics to superintend the whole social economy of a people, the converted natives both of North and South America dwindled under their care into the most helpless and ignorant of beings. The object of the experiment was to bring a wild race to domesticated habits, and the Indians were gathered into communities where they worked for a common stock; but their independent character was destroyed, and nothing better arose in its place. Of the one hundred thousand inhabitants living in thirty towns under the control of the Jesuits when that order was expelled from South America in 1767, there were not a thousand remaining in those east of the Paraná in 1825. The towns beyond the Parana have fared little better under Dr. Francia. (Sir Woodbine Parish's *Buenos Ayres and Provinces of La Plata.*) The Jesuits, in the course of about a century and a half, converted upwards of a million of the natives of both Americas. In Dr. Forbes's 'California,' compiled from original sources, the process of conversion is described as consisting of the offer of a mess of pottage and holy water; the acceptance of the latter being the condition of the former grant, and its reception a proof of faith. Attendance to prayers and meals were the exterior evidence of conversion. Sir Woodbine Parish states that the misrule of their civil governors, and the little respect inspired by the friars who were sent in place of the Jesuits, brought about the ruin of the Jesuit communities in little more than a quarter of a century. When they were displaced, and the people of the mission of St. Louis sent a memorial praying that the fathers might be allowed to remain, which Bucarelli, the governor, interpreted as the prelude of an insurrection, the simple people were found not in arms but in tears.

In 1700 the three orders of Capuchins, Jesuits, and Carmelites, were the most active missionaries. The Capuchins had twenty-five missions in Turkey, and missionary stations were established in Persia, Georgia, and Africa. The Jesuits had ten missions in Turkey, and the Carmelites three. Many of these missionaries had acquired a knowledge of medicine, and obtained access to families as physicians. In 1717 the Jesuits supported missions in the islands and continent of America, in Greece, Asia Minor, and the Archipelago, and in Egypt, Syria, and Persia, besides those in India. Louis XIV. made grants of land to the missionaries in Canada, and to them we are indebted for some of the earliest descriptions of North America.

In 1822 the cause of missions was revived in France by the 'Institution for the Propagation of the Faith,' which has committees at Paris and Lyon. Several popes have granted to its members certain indulgences; and in 1837, as a mark of gratitude and approbation, the pope presented the institution with the body of St. Exuperius, which had been recently discovered in the catacombs at Rome. The remains, richly ornamented at the expense of his Holiness, are enshrined in one of the churches of Lyon. Seventy-six Roman Catholic bishops in various countries have publicly expressed their approbation of the institution. Its income in 1838 amounted to 62,800*l.*, of which 41,678*l.* was collected in France, 2998*l.* in Belgium, 2776*l.* in the Sardinian states, 1098*l.* in the United Kingdom (768*l.* from England), 824*l.* from the States of the Church, 500*l.* from Prussia, and from other countries smaller sums were received. The receipts for France were 16,000*l.* more than in 1837. The 'Annals of the Propagation of the Faith' are published by the Society every two months; 48,000 copies are printed in French, 9500 in Italian, 6000 in German, 2000 in English, and 1000 in Flemish. The funds are placed at the disposal of the 'Seminary for Foreign Missions,' and the superiors of the Lazarite Missions and the Jesuit Missions. There is no part of the world in which Catholic missionaries are not supported. (*Geography of Missions.*)

The first Protestant mission of which we have any notice was founded by the church of Geneva, which sent missionaries to America in 1556; but it is believed to have existed only a short time. Early in the seventeenth century the Dutch, who had taken Ceylon from the Portuguese, admitted the natives to employments under their government only on condition of subscribing to the Helvetic Confession, and becoming members of the Reformed church. The higher rank of natives professed to abandon their former religion, and those whom the Portuguese had converted deserted their creed. Converts were baptised after learning the Lord's Prayer, the Commandments, and grace before and after meals. In 1663 the number of converts in one district was 62,000; and in 1668, in a district containing 278,000 inhabitants, 180,000 had made a profession of Christianity. In Java, Formosa, and Amboyna, the Dutch made attempts to gain converts. A church at Java was opened in 1621, and a century afterwards there were 100,000 Christians in the island. Translations from the Scriptures were made in the Cingalee and Malay languages.

It was some time after the English had begun to form settlements in North America before attention was directed to the religious condition of the natives. In 1644 a petition was presented to parliament from a minister of the Church of England, supported by many English and Scotch divines, which urged the duty of attempting to convert the natives of America to Christianity. Soon afterwards an ordinance of the Lords and Commons appointed the earl of Warwick governor of the islands and plantations of North America; and a committee was appointed to assist him in several matters, 'but chiefly for the advancement of the true Protestant religion, and for the spreading of the gospel of Christ among those that yet remain there in great and miserable blindness and ignorance.'

In 1646 the General Court of Massachusetts passed the first act 'for encouraging the propagation of the gospel amongst the Indians.' In 1649 an incorporated body was established with the authority of parliament, under the title of the 'President and Society for the Propagation of the Gospel in New England.' In 1661 Charles II. renewed the Society's charter, on the ground that it was now fit to lay a foundation for 'educating, clothing, civilising, and instructing the poor natives.' The design of the Society was to support and maintain ministers and schoolmasters to instruct the natives in the English language, and to teach them useful trades. Eliot, called the 'apostle of the Indians,' and Mayhew, had already laboured for several years

in the conversion of the native tribes of New England. In a narrative of their exertions, published in 1653, and dedicated to Cromwell, an account is given of the conversion of several chiefs. In 'A Later and Further Account,' published in 1655, Eliot states that a great desire for baptism had arisen amongst the Indians; but never was there a missionary so conscientiously scrupulous as to trusting to professions of this kind. He told the Indians 'how necessary it was that they should first be civilised by being brought from their scattered and wild course of life;' and he began the formation of a village, in which they might learn the advantages of living in a community. The Indians were taught various useful arts, and after several years were admitted as church communicants, previous to which they were required to give an account of their conversion and faith at a public examination.

In 'A Further Account,' published in 1659, there are sermons or short discourses of several converted Indians. Five Indian youths were receiving an education at the Cambridge grammar-school in Massachusetts, two of whom had been examined in Latin before the magistrates and elders of the place. In 1670 several 'praying towns,' as the villages of the converted Indians were called, had been erected under Eliot's auspices. In 1674 there were four 'praying-towns' in Massachusetts. Eliot died in 1690, at the age of eighty-six. Mather, Bourne, Sergeant, and Brainerd succeeded each other in the work of bringing the Indians to a knowledge of Christianity, but none of them laboured so successfully as Eliot. Brainerd was an ardent and enthusiastic labourer, and exhausted himself by his extraordinary exertions. He was sent to America in 1742, by the 'Honourable Society in Scotland for promoting Christian Knowledge,' and died in 1747. Amongst the supporters of the missions to the Indians of North America was the Hon. Robert Boyle, who, by will dated 1691, left a sum of money 'for the relief of poor Indian converts,' besides the residue of his estate to be laid out for 'the advance or propagation of the gospel amongst infidels.'

By the end of the seventeenth century the population of the English settlements in America had greatly increased, while the means of spiritual instruction had not been proportionally extended, and the small number of Episcopal churches which existed roused the friends of the Church of England at home to make exertions to supply the deficiency. While the conversion of the natives had chiefly attracted the attention of pious persons; it was found, in 1675, that 'there were scarce four ministers of the Church of England in all the vast tracts of North America.' Compton, bishop of London, prevailed upon Charles II. to allow 20*l.* for passage-money to ministers and schoolmasters who should go out to supply the deficiency; and a royal gift of 1200*l.* was procured to purchase a Bible, Prayer-Book, and the Homilies, for each parish. In 1679 it was stated that there was not a minister of the Church of England either in Pennsylvania, the Jerseys, or New England, and that these settlements were only occasionally visited by the chaplain to the fort at New York. Many families had never attended any public religious service since they had left England. The Society for the Propagation of the Gospel in Foreign Parts originated in the desire to supply the spiritual destitution of these and other settlements, and received a charter of incorporation on the 16th of June, 1701. The Society was composed, by charter, of the chief prelates and dignitaries of the Church, and several of the most eminent persons in the state. Archbishop Tennison was the first president. The amount received by the Society in the first four years after its incorporation was—first year, 452*l.*; second, 575*l.*; third, 864*l.*; fourth, 1343*l.* The number of subscribers, according to the first printed list, in 1718, was 260. The efforts of the Society were at first directed to building churches and sending out orthodox clergymen to the colonies. At the same time, and also before the Society was chartered, strong representations were made to the government of the important political influence which the French Jesuit missionaries exercised in Canada in keeping tribes neutral or in alliance with France; and at a court held at St. James's, April 3rd, 1700, representations being made to the effect that the five nations of Indians bordering on New York might probably be seduced by the French, the council came to the opinion, that besides the usual method of gaining the Indians by presents, 'another means to prevent the influence of the French missionaries upon them, and thereby more effectually secure their fidelity, would be to appoint two Protestant ministers, with a competent allowance, to dwell amongst them, in order to instruct them in the true religion and confirm them in their duty to her majesty. Ordered that the matter be referred to the archbishop of Canterbury.' The state of the Indians was one of the objects to which the charter directed the attention of the Society, but its funds were for some time expended in maintaining ministers within our own settlements. In 1704 Col. Dudley, governor of Newfoundland, wrote to the lords of the Board of Trade and Plantations, that if ministers were not sent amongst the Indians, 'to defeat the French missionaries, to whom they are infinitely bigoted,' we should lose their allegiance.

About the year 1680 the condition of the negro slaves in our settlements began to excite attention. In 1680 Morgan Godwyn, 'some time student of Christ Church, Oxon,' wrote a 'Persuasive to the Instructing and Baptising of the Negroes and Indians in our Plantations.' Towards the close of his life, Eliot had begun to instruct the negroes in New York; and in 1704 the Society for the Propagation of the Gospel established catechising schools in New York for the negroes, the number of negroes and Indians in the city being then 1500. In 1727, Gibson, bishop of London, addressed the missionaries in the English plantations, exhorting them to assist in instructing the negroes. In a sermon preached by Beilby, bishop of Chester, in 1783, before the above Society, the civilisation and conversion of the negroes were announced as one of the great objects of the Society.

The Danish and Moravian missions were the first two in which the chief object was the conversion of the heathen; for the exertions of the Society for Propagating the Gospel were for some time limited in its operations, and may be regarded in the early part of its existence rather as a 'Pastoral Aid' Society. The Danish missions owed their existence to Frederick IV., who, about 1705, became anxious that the gospel should be preached in the Danish settlements in the East Indies. Ziegenbalgh and Plutscho, who had been educated at Berlin, were the first missionaries sent out; they proceeded to Tranquebar, on the Coromandel coast. A correspondence on the subject of missions and the state of the heathen was commenced with persons in Denmark, Norway, Germany, and England, who took an interest in the subject. The reports of the two missionaries, which appeared annually, under the title of 'A Brief Account of the Measures taken in Denmark for the Conversion of the Heathen,' and which was translated into English, excited considerable attention. The Danish missionaries immediately established schools, and prepared tracts and small works in the Malabar language. In 1707 their first church was consecrated. In 1708 the translation of the Testament was begun, and completed in 1711: but they had no press, and were obliged to employ transcribers. The 'Society for the Propagation of the Gospel' opportunely forwarded a printing-press, a hundred reams of paper, six cwt. of type, and engaged a printer for the mission. In 1714 the missionaries had published thirty-four different works in the Malabar language, and fourteen others, written by Catholic missionaries, were used by their scholars and converts. They maintained and clothed fifty-six children in the schools, to defray the charge of which they had 'no certain fund that will supply the expense for one day.' In 1714 Frederick IV. established a college, or society, for the promotion of missions, the members of which were required to make an annual report of their proceedings. The instructions to the Society indicate both good sense and earnestness. The Society was directed to take into consideration the prospects and condition of converts:—'How they and their children (besides the knowledge of the principles of Christianity) may be instructed in useful arts, and how also they may be employed, according to their respective conditions and capacities.' Ziegenbalgh came to England in 1715, and had an interview with George II. and several members of the royal family. The archbishop of Canterbury and the bishop of London promised to assist the mission. About 1727 the Danish missionaries were desirous of extending their labours beyond the district of Tranquebar; and a missionary named Schulze was sent to Madras by the English Society for the Propagation of the Gospel. In 1721 Egede, a Danish missionary, proceeded to Greenland.

The Moravian missions commenced in 1731, and were supported with singular activity and perseverance. Count Zinzendorf, the founder of the Moravians, or United Bre-

thren, while attending the coronation of Christian VI. at Copenhagen, saw two natives of Greenland who had been baptised by Egede, and he heard with regret that the government was on the point of abandoning the mission in that country. About the same time he learned from a negro, who had become acquainted with his servants, and had a sister in one of the Danish West Indian islands, that the latter was earnestly desirous of receiving religious instruction. The congregation of the United Brethren at Herrnhuth, then consisting of only six hundred exiled persons, poor and despised, were warmly affected by the statements which Count Zinzendorf made on this subject, and some even expressed themselves willing to sell themselves as slaves to have the opportunity of instructing the negroes. In eight or nine years after they had begun to send out missionaries, Greenland, the islands of St. Thomas and St. Croix, Surinam, Berbice, Lapland, Tartary, Algiers, Guinea, the Cape of Good Hope, and Ceylon, had become the scene of their labours. The Greenland mission was commenced in 1733, and was supported in spite of extraordinary hardships and difficulties. The missionaries were often compelled to put to sea in crazy boats to obtain a supply of fish, and shell-fish and sea-weed were not unfrequently their only food. For five years they persevered in bearing up against these hardships, though as yet the mission had not been productive of the slightest advantage to the natives. Their endeavours were however at length successful, and a community of natives was established at New Herrnhuth. In twenty-five years about 700 Greenlanders had been baptised; and in 1767 the settlement contained 830 individuals, and had become a pleasant village in the midst of a desolate region. Sheep, goats, and vegetables had been introduced. Some of the Greenlanders had learned to read and write, and were taught church music. In 1758 a second settlement was formed, called Lichtenfels; and in 1774 a third, called Lichtenau. The mission in the island of St. Thomas was commenced in 1732; and in 1738 about 800 negroes were under religious instruction, and some time afterwards the number of baptisms averaged 100 a-year. From 1732 to 1762 sixty-six brethren and sisters who had gone out as missionaries died in the three Danish West India islands. In 1754 three of the Moravian brethren proceeded to Jamaica at the request of several gentlemen of the island, owners of estates, who built a house for their residence, and encouraged them in instructing their negroes. Scarcely any opposition was made to the missionaries, but after a time the work languished. In 1734 a party of the brethren settled in Georgia, in North America, with the intention of introducing Christianity amongst the neighbouring tribes of Indians; but the European settlers in the colony, by their constant persecution, at length drove the brethren into Pennsylvania. The colonists had represented that the brethren were in league with the French Canadians; and for the sake of annoying them, used every means in their power to demoralise the Indians. In the back settlements of Pennsylvania, to which they were at length obliged to remove, they built a village for the baptised Indians, called Gnadenhutten, which was broken up by an Indian war. In 1754 the village of Nain was built, and after a few years was in like manner destroyed. They then built a town called Friedenshutten. The settlement of Bethlehem was so obnoxious to the colonists in the two Jerseys, that proclamation for its destruction was made by beat of drum, and every means were taken to exasperate the lower classes of the people against the brethren. They were obliged to keep guard night and day for fear of an attack, and at length were removed for safety to Philadelphia, where they and the Indians remained in the barracks for sixteen months, during which numbers died of fever and small-pox.

In 1735 an attempt to send a missionary to the Calmuc Tartars failed; but about 1747 the brethren formed a settlement in Asiatic Russia, where they had constant intercourse with the Calmucs, but made no converts, with the exception of four girls whom they ransomed, and a blind girl who had been left to die. In 1739 it was determined to send a missionary to Abyssinia to form a correspondence with the Christian church there; but this design was not effected until 1752. In 1759 and 1768, settlements were formed in Tranquebar and in the Nicobar islands. A mission to Labrador, which had been attempted without success a few years before, was established on that coast in 1752, with the encouragement of the English Board of Trade and Plantations, and the Lords of the Admiralty. Some of the missions paid their own expenses, with the exception of buildings and journeys of the missionaries. The brethren introduced amongst their converts a discipline similar to their own, and baptism was only administered to those whose life gave evidence of a change of heart. In 1742 the Moravian brethren residing in London formed themselves into a 'Society for the furtherance of the Gospel.' They received and entertained missionaries who came from the Continent to London to embark for distant countries. This Society was revived in 1818.

Till within the ten years preceding the close of the last century, England had taken a very small share in missions. The Society for the Propagation of the Gospel in Foreign Parts was incorporated in 1701, and nearly a century elapsed before any other similar institution was founded. At present Great Britain is the most active of all Christian countries in the work of converting the heathen.

The 'Society of Particular Baptists' formed the second association in England for the conversion of the heathen. Before the year 1786, Carey, a minister of this persuasion, and afterwards eminent as a linguist and missionary, had directed his attention to this subject, to which he was in some degree led by a great love of geographical knowledge; and some time after the above date he published 'An Enquiry into the Obligation of Christians to use means for the Conversion of the Heathen.' He brought the subject under the notice of a meeting of Baptist ministers held at Clipstone, Northamptonshire, some time in 1791. At a similar meeting held at Nottingham, in May, 1792, the following resolution was adopted:—'That a plan be prepared against the next ministers' meeting at Kettering, for forming a Society amongst the Baptists for propagating the Gospel among the Heathen.' In October the Society was formed: at a second meeting, at the end of the month, several subscriptions were announced; and 70*l.* was sent from Birmingham by the Baptist congregation there, who had formed themselves into an Auxiliary Society. In November, a public address on the state of Heathen countries was issued. In March, 1793, Mr. Thomas, who for nearly ten years had been exerting himself in India to promote Christianity, was chosen with Mr. Carey as the first of the Society's missionaries; and they shortly afterwards embarked for the East Indies. Having set up a factory, in the hope of making the mission pay its own expenses, the propriety of missionaries engaging in secular employments was warmly contested by the Society at home, and a letter of 'serious and affectionate caution' was addressed to the missionaries at a meeting held in April, 1795. At this meeting a resolution was adopted for establishing a mission at Sierra Leone; but of the two missionaries sent out, one embroiled himself with the authorities and went to America, and the other came home for his health. In 1796 a third missionary was sent to India. The following form of agreement was entered into by the Baptist missionaries in Bengal, in 1805:—'It is necessary, in our intercourse with the Hindoos, to abstain, as far as we are able, from those things which would increase their prejudices against the Gospel. . . Nor is it advisable at once to attack their prejudices by exhibiting with acrimony the sins of their gods; neither should we, upon any account, do violence to their images, nor interrupt their worship; the real conquests of the Gospel are those of love.' In this spirit the Baptist missions have effected considerable good in India, by the establishment of native schools, and translations of the Scriptures, as well as by preaching. At an early period of the mission, a printing-office was established at Serampore, and in 1806 proposals were made for the translation of the Scriptures into fifteen Eastern languages. A total expenditure of 13,000*l.* was incurred in the Serampore mission in the course of five years, of which only 5740*l.* was received from England, the remainder being made up by the labours of the missionaries, and the emoluments arising from the professorship which Dr. Carey held in the college of Fort William. In 1807 the tracts issued by the mission were required to be submitted to the Indian government before publication, in consequence of some inconsiderate expressions used in a tract which had been issued without revision; in which, amongst other things, Mohammed was called a tyrant. In March, 1812, the printing-office was burnt down, and founts of type in sixteen languages were destroyed, and sheets of translated works in progress. On the disaster being known in England, the sum of 10,611*l.* was raised in less than two months to replace the loss, be-

sides a considerable sum in Bengal, and 1500*l*. in the United States. In 1827 the missionary efforts of the Baptists were divided by a separation of the Serampore mission from the general missions of the Society, but the differences were terminated in 1838, and the two Societies are now united. Foreign missions have also been established by the Free-will Baptists and by the American Baptists.

The 'London Missionary Society' was formed in September, 1795, and consisted at first of Christians of various denominations, but it is now supported by the Independents. In consequence chiefly of a memoir read before the Society by the Rev. Dr. Haweis, rector of Aldwinkle, Northamptonshire, this Society directed its first efforts to the South Sea Islands, where no missionaries had before laboured. In August, 1796, twenty-nine missionaries, several of whom had wives and families, embarked on board the ship 'Duff,' which the Society had purchased. The 'Duff' reached Otaheite in March, 1797, and the missionaries were received by the natives in the most friendly manner, and a district being ceded to them in due form, twenty-five persons, including seven women and children, took up their abode in the island. The commencement of this mission was a period of great excitement to the friends of the cause in England; and on the return of the 'Duff,' a day of thanksgiving was appointed in the Independent churches. In December, 1798, the 'Duff' sailed on her second voyage to the South Seas with twenty-nine missionaries and a superintendent, but was captured by a French privateer on the 19th of February, and taken to Rio, and on re-embarking at that place, they were again captured, and ultimately returned to England after an absence of ten months. In the meantime the mission in Otaheite was almost on the brink of ruin, the natives having become unfriendly to it. Eleven of the missionaries, with eight women and children, left the island for Port Jackson, seven of the missionaries determined upon remaining, and several proceeded to Tongataboo. To prevent an attack of the natives, the missionaries who had remained at Otaheite offered to give up their personal property and stores and tools to Pomare, the king, but he declined taking charge of them, and they were daily in fear of personal injuries. One of the missionaries relapsed, and married a native female, and another made a declaration of infidel opinions. In May, 1800, before these events had become known in England, eleven other missionaries had sailed for Otaheite in a convict ship, in which a malignant fever broke out. Of this number one died at Port Jackson, one abandoned the mission at that place, and one was taken home, at the request of his brethren, for insubordinate conduct. The missionaries who had been left on the island made no progress in their work, and in the course of five years had scarcely acquired a slight knowledge of the language. In 1808, on a war breaking out in Otaheite, the married missionaries sailed for Huaheine; when their houses were burnt and their gardens laid waste. In February, 1810, they retired to New South Wales. Misfortunes had also overtaken the mission at Tongataboo. One missionary returned his Bible to his brethren, three were murdered during a civil war, and the remainder were destitute of clothes and often of food, and were frequently ill-treated by the chiefs. A mission to the Marquesas was also broken up. In July, 1811, some of the missionaries returned to Otaheite at the request of Pomare. In 1821 the Society sent out a deputation to visit the various stations in the South Seas, their directions being 'to make themselves thoroughly acquainted with the state of missions and of the islands.' The result of their inquiries is contained in a 'Journal of Voyages and Travels,' by Tyerman and Bennet, edited by James Montgomery, London, 1831. In December, 1798, the Society sent out missionaries to South Africa, and before 1804 they had established themselves at Bethelsdorf, on the Zak river, Orange river, and in Namaqualand. In 1804 the Society extended its operations to the East Indies, and missionaries were stationed at Vizigapatam and Travancore. In 1807 Mr. (afterwards Dr.) Morrison proceeded to China with the intention of preparing a translation of the Scriptures into the Chinese language, as a preliminary step to the introduction of Christianity into the Chinese empire. [MORRISON.] In December the attention of the Society was directed to the West Indies, and a missionary station was established in Demerara.

In 1804 the 'Society for Missions to Africa and the East' was established by some members of the Established Church. The Society is now called the 'Church Missionary Society for Africa and the East,' though it sends out missionaries to every quarter of the world. The first missionaries sent out by the Society were educated at the Missionary Seminary in Berlin, and commenced their labours in the Susoo country. The Episcopalians of the United States also have independent missions in foreign countries.

The Wesleyan Methodists were for many years engaged in missionary labours before they formed the 'Wesleyan Methodist Missionary Society' in 1817. Wesley himself visited America for the purpose of affording religious instruction to the slaves in Georgia. In 1786, Dr. Coke, accompanied by three other individuals, proceeded to Nova Scotia, and before their return they visited some of the West India islands, where they met with great opposition on the part of the planters. The peculiar difficulties which the Methodists encountered in their attempts to instruct the negroes are detailed in Dr. Coke's 'Rise, Progress, and Present State of the Methodist Missions,' published in 1804. The attempts made by the Jamaica House of Assembly to put a stop to the preaching of the missionaries, engaged the house in a contest with the government at home, which was marked by singular duplicity, and attempts, on the part of the assembly, to evade the authority of the English parliament. The Methodist Episcopal Church in the United States sends out foreign missionaries.

In 1796 the 'Edinburgh Missionary Society' was established by some ministers and members of the Established Church of Scotland. In conjunction with the Glasgow and London Societies, it sent out missionaries to the western coast of Africa, but death and disease prevented the success of the mission. In 1802 a mission was established by this Society in the neighbourhood of the Caspian Sea. The emperor of Russia granted them land on favourable terms, and in 1810 the settlement of the missionaries consisted of thirty-nine persons. A printing-press was set up, tracts were distributed, and slaves ransomed with a view of being instructed to act as catechists.

In addition to the above societies, there has been lately formed in England the 'Colonial Missionary Society.' The 'Society for propagating Christianity amongst the Jews,' which expends above 17,000*l*. a year in this object, may in some respects be regarded as a missionary institution; and there are several similar societies, but as they are not designed for the conversion of heathen people, they do not come within the limits of the present notice. The 'Home Missionary Society' belongs to this class. It has stations in districts where there is a deficiency of places of worship. The annual income of the Society is about 7000*l*. The Baptists have established a Home Society, which has an annual income of upwards of 2500*l*. a year. The 'Pastoral Aid Society' is designed to remedy the deficiencies in the Established Church, and was instituted in 1836. It grants about 18,000*l*. a year to 179 clergymen and lay assistants, who are sent to populous districts which are not sufficiently provided with regularly appointed clergymen. Within the last four years, 'City Missions' have been formed in London and several of the large towns. Agents are appointed who visit the poor and exhort and read to them the Scriptures. The 'London City Mission' has an income of upwards of 4000*l*., and employs 49 agents, who last year made 186,515 visits, and distributed 223,056 tracts. The 'Society for the Promotion of Christian Knowledge,' the 'Bible Society,' and the 'Tract Society,' though not missionary societies, are auxiliaries of foreign missions, whose objects they promote by grants of books, &c.

There are many missionary institutions in Europe and the United States. The 'American Board of Commissioners for Foreign Missions' is the principal institution of the kind in the United States; and each of the principal sects in that country, as in the case of the American Baptist, has its own institutions for sending out missionaries, each of which has numerous auxiliary societies in union with the central society. In continental Europe the principal missionary societies are—the Berlin Society, German Society, Netherlands Society, Paris Society, Rhenish Society, and the Society of the Moravian Brethren.

Present State of Societies.—The expenditure of five of the principal British societies engaged in missions amounted to above 350,000*l*. according to their last annual Reports; and the material support which is afforded them by other religious institutions would considerably swell this amount there are also several institutions whose operations are on a small scale.

1. Incorporated Society for the Propagation of the Gospel in Foreign Parts. Receipts for 1837, 43,365*l.*; expenditure, 55,949*l.*; number of subscribers about 12,000; the number of legacies of above 100*l.* received from 1702 to 1837, 571, of which 50 amounted to sums above 1000*l.*, including two of 45,000*l.* and 30,000*l.* each. The receipts consisted of subscriptions, donations, and legacies, to the amount of 16,082*l.*; legacies, 475*l.*; dividends and rents, 5747*l.*; special fund raised for the education and religious instruction of the negroes in the British West Indies, 8059*l.*; portion of parliamentary grant for erection of school-houses in the West Indies, 13,000*l.* The chief expenses were under the following heads:—North America (dioceses of Quebec and Nova Scotia), 12,264*l.*; India, missionaries and teachers, 8933*l.*; expenses of Bishop's College, Calcutta, including the college press, 4325*l.*; several general expenses of missions and schools, 1821*l.*; Cape of Good Hope, 2 missionaries and outfit, 339*l.*; West Indies, payments for the erection and enlargement of churches, chapels, and school-houses, 13,890*l.*; towards the support of clergymen and unordained teachers engaged in the religious instruction of the negroes, 7169*l.* Urged by the recent social changes in the West Indies and the spiritual destitution of the penal settlements in Australia, the Society has recently made exertions in those two quarters. From 1813 to 1833, the Society had the management of a grant annually voted by parliament for the support of clergymen in the North American Colonies. Notice was given in 1832 that this grant would be discontinued in future; but on the remonstrance of the Society, that the whole of the missionaries would be unprovided for, the government agreed to continue the allowance for three years longer on a reduced scale. In 1832 the sum of 12,000*l.* was voted; 8000*l.* in 1833; and 4000*l.* in 1834. The Society has been compelled to reduce the salaries of its missionaries in that quarter, and in 1837 was compelled to sell 10,000*l.* of its funded property to meet deficiencies. Previous to 1823, the 'Society for promoting Christian Knowledge' expended a portion of its funds in supporting missionaries in Southern India, but in that year this department was placed under the Gospel Society. The number of missionaries now employed is 231, of whom 169 are employed in British North America.

2. Baptist Missionary Society, 1837-8. Receipts, 22,416*l.*; expenditure, 20,622*l.* The cost of maintaining missionary stations in the following countries, in 1837, was—for Continental India, 4237*l.*; Ceylon, 390*l.*; Java, 346*l.*; Sumatra, 10*l.*; Jamaica, 7452*l.*, and 250*l.* for chapels in the same island; Bahamas, 1249*l.*; Honduras, 380*l.*; South Africa, 27*l.* At these and the various sub-stations in connection with them, 59 missionaries, 44 native preachers, and 59 schoolmasters were maintained. In 1835 the Society received a legacy of 5784*l.*

2. London Missionary Society, 1838. Receipts, 70,255*l.*; expenditure, 76,818*l.* Disbursements in 1837-8 on account of the following missions:—South Seas, 10,327*l.*; Malacca, 1989*l.*; Singapore, 200*l.*; Penang, 972*l.*; Java, 637*l.*; Northern India, 6962*l.*; Southern India, 16,104*l.*; Russian Empire, 552*l.*; Corfu, 107*l.*; South Africa, 8814*l.*; Mauritius, 426*l.*; Demerara, 3841*l.*; Berbice, 5316*l.*; Jamaica, 7497*l.* Of the amount raised by the yearly contributions, 15,779*l.* were specially subscribed for seventeen different objects, of which 4001*l.* was for a South-Sea mission-ship; 800*l.* for exploratory voyages; 1451*l.* for female education. The sum of 4500*l.* was received from government in aid of school houses in the West Indies. The Society, at 455 stations and out-stations, maintains 640 European missionaries and assistants, of whom 135 are missionaries, and 32 European and 473 native assistants. The number of churches under their care is 93, with 7347 communicants; and 568 schools contain 36,974 scholars. The Society possesses 17 printing establishments.

3. Church Missionary Society, 1837. Receipts, 72,031*l.*; expenditure, 91,453*l.* The West African mission was maintained at a cost of 4014*l.*; South-African, 1709*l.*; the Mediterranean missions (including Malta, Greece, Asia Minor, Egypt, and Abyssinia), 6558*l.*; North India, 11,523*l.*; South India, 8472*l.*; Western India, 2927*l.*; Ceylon, 3987*l.*; China, 491*l.*; New Zealand, 12,754*l.*, including the purchase of goods for barter with the natives; New Holland, 172*l.*; Jamaica, 9210*l.*; Guiana, 1439*l.*; Trinidad, 3594*l.*; North-west America, 1945*l.* At 95 principal stations, 68 English and 10 Lutheran clergy are maintained, and 81 laymen and 3 female Europeans, besides 5 native clergymen and 352 laymen, and 18 female teachers, making 541 individuals. Number of schools 441, attended by 21,591 scholars.

4. Wesleyan Methodist Missionary Society, 1837. Receipts, 84,818*l.*; expenditure, 100,077*l.* The number of missionaries employed was 314; catechists and readers, 3176; salaried teachers, 295; gratuitous teachers, 3336: making the total number of agents 7121. The number of members in society was 66,629, and 49,538 children and adults attend the schools; the total number of persons immediately under the care of the Society in foreign parts being 116,167, as far as could be ascertained. In 1837 twenty donations were received of 50*l.*; fourteen of 100*l.*; six averaging above 360*l.* each; and one anonymous gift of 2000*l.* The sum of 3864*l.* was received from Ireland in subscriptions, and upwards of 2000*l.* from the town of Leeds. In 1818 a legacy of 9986*l.* was received. Expenses of stations:—Ireland, 3530*l.*; France, 2169*l.*; Spain, 944*l.*; Ceylon, 6412*l.*; Continental India, 5451*l.*; New South Wales, 1880*l.*; Van Diemen's Land, 2292*l.*; New Zealand, 2323*l.*; Friendly Islands, 3315*l.*; South Africa, 8956*l.*; Western Africa, 3959*l.*; West Indies, 22,000*l.*; British America, 9000*l.* During the year the Society sent out 48 missionaries, 17 of whom were accompanied by their wives.

5. Missions of the Church of Scotland, 1837. The mission under the direction of a committee of the General Assembly is at present confined to the department of general, scientific, and religious instruction, and has seminaries at Calcutta, Bombay, and Madras. In the Assembly's school at Calcutta upwards of 700 boys and young men, of all classes and castes, are taught the common branches of education, algebra, mathematics, and other sciences. At Bombay above 1000 native children attend the Society's schools, and there is also a school at Poona, in the same presidency; and in 1837 a school was established at Madras. The funds received in aid of the Assembly's missions average about 4000*l.* a year.

A society has recently been established at Glasgow which has sent missionaries to Caffraria. The 'London Corresponding Committee' is an auxiliary of the General Assembly, and about 500*l.* a year are raised by it in aid of foreign missions. Missionary operations have been commenced at the Cape of Good Hope, in connection with the Church of Scotland.

6. Missions of the United Brethren, 1837. These missions have long been held in high estimation in England, and about 4300*l.* are annually contributed here for their support, under the direction of the 'London Association.' The number of missionaries employed by the Moravian Brethren has been increased from 155, in 1817, to 237, in 1838. A sum amounting, on an average, to 12,000*l.* a year is raised for their support, of which 5840*l.* is received from persons of other denominations. About 50,600 souls are under the care of the Brethren, namely, 44,000 negroes in the West Indies, 3600 Hottentots and Caffres, and 3000 natives of Labrador, Greenland, and North America.

Most of the societies publish periodical accounts of the state of their respective missions. The last Annual Report of the Church Missionary Society shows that about 2500*l.* had been expended in preparing and publishing these works, viz. for 12,280 copies of Annual Report, 20,000 abstracts of do., 145,500 of 'Missionary Record,' 601,375 of 'Quarterly Paper,' and 3050 copies of the 'Missionary Register.' The London Society's expenditure under the same head was 1754*l.*, and others in proportion; but it is by this extensive dissemination of missionary intelligence that the public have been brought to entertain so strong an interest in missions.

The exertions of other missionary societies are noticed in the following section.

Geography of Missions.—In the Thirty-eighth Report of the Church Missionary Society it is observed that each mission is marked by various degrees of ignorance and knowledge. 'There is a kind of graduated scale, measuring from the Zoolu tribes, who are at the lowest point, where even the sovereign is only learning to spell; advancing further, to the New Zealanders, who are just beginning to catch the most elementary ideas of the Scriptures; thence further, tracing the plain but useful studies of the negro on either side of the Atlantic; then reaching further, to the yet imperfect modern literature of the eastern regions of the Mediterranean; thence, rising higher still, to the varied

acquirements of India; and, highest of all, to the cultivated and improving native society of Calcutta and other parts of Bengal.' Under fourteen heads we give a view of the missions of all the principal societies.

1. *Western Africa.*—Stations at Sierra Leone, Bathurst, Cape Coast, Cape Palmas, Freetown, Kissey, &c. Stations of the Church missions, 12; 7 European clergymen and 9 laymen employed, and 19 native teachers; communicants, 902; schools, 24; scholars, 3663; baptisms, 91; candidates, 697; average attendance on public worship, Sunday morning, 3870—evening, 1880—week-day evening, 1880. Wesleyan missions: 14 missionaries and 42 catechists and readers, 24 salaried teachers, 2324 members in society, and 1495 children and adults in the schools. At Macarthy Island, 300 miles up the Gambia, 200 individuals have been baptised. A grammar in the Mandingo language has been printed, and also the Gospel of St. Matthew in the same language. The 'Foulah Mission Institution' is intended to promote the temporal as well as the spiritual welfare of that people. The 'German Missionary Society' has established a mission in the Ashantee country, and the 'American Episcopal Missions' one at Cape Palmas, to which three missionaries have been appointed, who are intending to establish a superior school. The 'American Board of Missions' has a station in the same quarter, where a printing-press has been set up and schools established. The children are docile, and learn to read with tolerable ease in three months. The 'American Baptists' have also missionaries employed in this part of Africa, which is also the scene of the labours of the American Colonization Societies.

2. *South Africa.*—The United Brethren employ 45 missionaries amongst the Hottentots, Caffres, and Tambookies. At the settlement of Genadendal the natives are employed as smiths, waggon-makers, carpenters, tanners, and masons. In the schools reading, writing, and accounts are taught; sewing is taught in the female schools. Infant schools have been established. Amongst the Tambookies many of the women have begun to wear gowns; some of the men have planted wheat, and manured their land. The London Missionary Society has 31 stations, 24 missionaries, and 18 assistants; 18 churches, 1382 communicants, and 4721 scholars. This statement includes the stations amongst the Caffres, Griquas, and Namacquas, and others beyond the colony. The state of the schools among the Hottentots is encouraging; the people are rapidly improving in a knowledge of agriculture, and many of them lead a moral life. The Bechuanas are said to be most anxious in their desire after knowledge. Wesleyan missions: 21 missionaries, and 24 salaried and 173 gratuitous teachers, are employed in the Cape Colony and amongst the Caffres and Bechuanas; the number of members in society is 1281, and 1594 children attend the schools. The missionaries use the Sichuana language, and several elementary books have been printed at the mission press for the use of the natives. The French Society of Protestant missions has four principal stations in South Africa, north of the Orange river. The French missionaries state that among the Bechuanas the progress of conversion has been very slow, and that the chiefs impede this work as much as possible; but their hopes are in the rising generation. Among the Bassouto-Bechuanas many adults have learned to read, and both men and women have clothed themselves in the European manner. The Rhenish Society employs missionaries, who are chiefly engaged in preaching to the colonists of the Cape of Good Hope, as well as in organising schools. The American Board has four stations in the neighbourhood of Port Natal, and the missionaries have set up a press for printing tracts in the Zoolu language. The Church Missionary Society and the Baptist Society have only lately commenced missions in South Africa.

3. *African Islands.*—Madagascar. In 1835 the work of missions was making considerable progress, when an edict was issued suppressing all Christian instruction. [MADAGASCAR.] A few converts afterwards met in secrecy on a mountain, for the purpose of reading the Scriptures and other religious exercises; but the practice becoming known to the authorities, sixteen were apprehended, one of whom, a woman of superior mind named Rafaravary, was put to death, after having been flogged with great severity, in the hope that she would make a confession of the names of her companions. She met her death with firmness and composure. There have been other martyrs, and no instance of apostacy has yet been recorded of the Christian converts. A large number of persons are still in bonds or in slavery, and the queen proposed to put them all to death, but was dissuaded by her officers. No change in this state of things is expected at present.

4. *Inland Seas.*—The Red, Mediterranean, Black, and Caspian seas, and Persian Gulf. At Malta the Church Missionary Society has a press, at which, in 1837, 25,338 copies of tracts and other works were printed in the Greek, Arabic, and Turkish languages. The Wesleyan Society has also a station at Malta. In the kingdom of Greece above 1100 young persons, from 4 to 17 or 20, are receiving instruction through the instrumentality of missions. The American Board has stations at Athens, Argos, and Ariopolis in Laconia, and the missionaries are employed in preaching, and in the publication and distribution of tracts, and in establishing schools. In 1837 above 17,000 copies of books, containing 616,427 pages, were printed at Athens at the expense of the mission. American Episcopal Missions:—Schools have been established at Athens, which are attended by above 600 scholars. The mission family comprises 40 souls. So successfully has the work of education been conducted in the mission seminary, that applications have been received by the heads of the mission from Constantinople, Asia Minor, Moldavia, &c., to take under their care the daughters of rich Greeks, to educate them as they thought best. Five male and eight female Greek teachers are employed. In the island of Syra the Episcopal (American) Missions have a printing establishment, which, in 1837, issued 29,000 copies of thirteen publications, varying in size from 6 to 428 pages each. This press is about to be given up. Crete is also a station of the same Society. The state of education in this island is deplorable, and scarcely a copy of the Scriptures is to be found. Corfu is a station of the London Missionary Society, and their missionary performs the duties of inspector-general of schools in the Ionian Islands. The British government has recently ordered books to be printed for a regular course of instruction in the Lancasterian schools of the Ionian Islands. The American Board has established schools at Constantinople for the Greeks and Armenians of that capital, and endeavoured to excite among them a religious spirit; but these efforts have met with great opposition.

Asia Minor.—The exertions of the Church Missionary Society to establish Greek and Armenian schools at Smyrna have been unsuccessful, the Armenians declining their services, and the Greek hierarchy warmly opposing them. In the meantime the missionaries are preparing useful and scriptural books in the Turkish language. The American Board has a press at Smyrna, at which, in 1836, there were printed 25,618 copies of thirty-eight different works in modern Greek, besides copies of works in Armenian, including a new version of the Armenian Testament. Two magazines, in Greek and Armenian, are published monthly. The schools which were attempted to be established have failed; but an interest has been excited on the subject of education, and the missionaries at present chiefly direct their attention to the distribution of books in Asia Minor.

Egypt.—The Church Missionary Society has established schools at Cairo, which are mostly attended by Copts. There are 114 scholars in the female school, in which needlework is taught, and reading and writing.

Abyssinia.—In consequence of the opposition excited against the servants of the Church Missionary Society, they have been obliged to return to Cairo. The mission was encountering considerable difficulties, when the arrival of an Italian priest and a Frenchman, for the purpose, it is understood, of reviving the Roman Catholic mission in Abyssinia, considerably increased the clamour against them. The Italian priest afterwards penetrated to Gondar, and opened a communication with the king of Shoa. The ejected missionaries had procured a firman to the king of Shoa, and at the latest accounts were preparing to visit his territories. Persia:—the American Board sent a mission to the Nestorians in 1835, with instructions to form a station on the western side of the Kurdish Mountains. One of the objects of the mission is to improve education. There are 38 pupils in the seminary, or boarding-school, who are taken from different Nestorian villages; a Sunday school has been established; and a fount of Syro-Chaldaic type been received; but the Board has not been able to find a printer to undertake this department of the mission. A physician is attached to the mission, who is resorted

to by the people from all quarters. The American Episcopal Society is on the point of sending a missionary to Northern Persia, Syria, and Palestine: the American Board has stations at Beyrout and Jerusalem, and service is performed in the Arabic language. Twelve pupils belonging to the Maronite, Greek, Greek-Catholic, and Armenian churches, with two Protestants and a youth of Jewish descent, are boarded in the Mission Seminary, and are educated with a view to future usefulness in the missionary cause. The female school is attended by 25 pupils. The missionaries state that a female boarding-school might be advantageously opened at Beyrout. At the press 16,200 copies of seven different works were printed in 1837 for distribution. At Jerusalem a small native congregation has been formed. Male and female schools have been opened. The demand for books is said to be increasing in Syria and Palestine.

Asiatic Russia.—The stations of the German Missionary Society were abolished by an ukase of the emperor in 1837. Siberia:—conversions have been rare in this quarter. The London Missionary Society has a station 160 miles south-east of Irkutsk, and another at Khoton, where a press has been established, at which a translation of the Bible is now printing; and there is a third station at Ona.

Mohammedan Missions. A visit to Persia has induced Mr. Merrick, of the American Board, to form an opinion that missions to Mohammedan countries are at present premature, and that the preliminary step should be to elevate the character of the Oriental churches, whose condition degrades Christianity in the eyes of the followers of Mohammed.

5. *China and India beyond the Ganges.*—In China the difficulties in the way of missionaries obtaining access to the country have been latterly rather increasing than diminishing; the frontier stations are therefore regarded with great interest by the friends of missions. Most of the principal missionary societies throughout the world have stations in India beyond the Ganges. The Catholics are the only European missionaries who preach Christianity in the interior parts of the Chinese empire. The London Missionary Society has not yet been able to fill the vacant station at Canton. At Singapore the Society has two labourers and two at Malacca; and at the latter place service is performed every Sunday to a crowded congregation of Chinese. In 1837 the number of Chinese baptised was 29; and there were 205 boys and 115 girls in the Chinese, and 70 boys and 20 girls in the Malay schools. The Chinese girls' schools are entirely supported by the sale of useful and fancy articles sent from England. The number of students in the Anglo-Chinese college is six, besides Chinese youths. Above 30,000 copies of the Scriptures, or portions thereof, and tracts, are distributed annually. At Penang there are two missionaries but no native communicants. Five Malay schools contain 111 scholars, and 11 Chinese children are under instruction. The issues from the press at Penang, in 1837, were 12,500 publications in Malay; and the circulation 19,000, of works in the Malay, Chinese, Tamul, Dutch, and English languages. The Malay publications were sheet-tracts and were issued in consequence of some atrocious murders. A Society has been formed at Penang for the Diffusion of Christian Knowledge amongst the Chulicks and Bengalees inhabiting the island; and a school for girls has been established under its auspices. The American Baptists have missions in Siam, and at Bankok, a city supposed to contain about 500,000 inhabitants, four-fifths of whom are Chinese, they have established printing and lithographic presses. In 1837 about two million octavo pages in the Chinese and Siamese languages were printed. These publications are distributed as fast as they can be worked off. Four of the missionaries devote themselves to the Siamese, and five to the Chinese. In a recent excursion about 60 miles north of Bankok, a point never before reached by Protestant missionaries, 900 Siamese and 3000 Chinese tracts were distributed to eager inquirers. Evidence is adduced in the 'Report' showing that these tracts are extensively read. In a letter from the Roman Catholic Apostolic Vicar of Siam, it is stated that 'books are received, because they cost nothing; are laughed at, but no one is converted.' The American missionaries, it is stated, make handsome presents to the authorities, and have built 'commodious houses, where they spend their time agreeably in the society of their wives and families.' The Catholic missionaries, on the other hand, regard the mortifications and hardships of their labours as calculated to promote the objects of their mission. (*Annals of the Propag. of the Faith*, 1838.) The American Baptists have also a Burmah mission consisting of several stations, at which 30 missionaries and a large number of native assistants are employed. In 1836, 343 Karens and Burmans were baptised. The missionary press is conducted on a scale which the most sanguine would scarcely anticipate. The printing-office is in the heart of the city of Maulmein, and is built of brick in the form of an L, 78 feet long each way and 56 wide, and is two stories high. It contains a power-press, four hand-presses, twenty-five cases of types, founts in three languages, and, with the binding department, employs 25 natives. By this time five additional presses and a large supply of paper have been received. It is intended to set up a press in an out-station where 8000 tracts had recently been distributed in two days at a festival. At the station of Sudiya the Board have three missionaries, a printer, and assistants. About nine years ago the American Board commenced a mission in China, and it has now two missionaries stationed at Canton, who are chiefly occupied in preparing works for the press, and revising the Scriptures. At Macao the Board has set up a press, and the printer who superintends it is studying the Chinese and Japanese languages. Two missionaries and a physician are stationed at Bankok, the latter of whom is daily visited by 20 or 30 patients, whom he addresses on subjects of religion. A Chinese and a Siamese school have been established, which are attended by only a small number of pupils. Four missionaries and a physician are stationed at Singapore, who are acquiring the Chinese language. The school is considered the most important department at this station. The press is very actively employed in printing Chinese tracts, also works in the Malay and Japanese languages; but it is stated that the ability of the Chinese to read is over-rated. The Chinese station of the American Episcopal Missionary Society is at Batavia, but its efforts are intended to be directed to China. Here also are two missionaries and a physician engaged in studying the Chinese and Malay languages. A Chinese school of 20 boys and 9 girls is found an invaluable aid in acquiring the Chinese colloquially. The Church Missionary Society and the Baptist Missionary Society are the only English societies which at present send missionaries beyond the Ganges. The former Society has stations at Akyab, an island 450 miles south-east of Serampore, and at Chittagong; and the latter has one missionary at Singapore, who is studying Chinese and Malay.

6. *India within the Ganges.*—This quarter is by far the most important field of missionary exertion, and the moral obligation to convey religious instruction to nearly 150,000,000 of people under our dominion has been deeply felt in Great Britain. India is also the active scene of missionary labours for the American and many of the European societies. It is difficult to separate the exertions of such institutions as the Bible Society from those societies whose exclusive object is the conversion of the heathen. The British and Foreign Bible Society has expended 112,000*l.* in this portion of India, either in grants of books or paper, or for the purposes of translation; and the Scriptures have been printed in all the principal languages and dialects of India. The 'Christian Knowledge Society' has sent funds for the erection of churches and mission-houses, and presented depôts of books and lending-libraries, and has supplied the materials for furnishing schools and printing-offices. The Prayer Book and Homily Society has sent out its translated works. The Religious Tract Society distributes annually an immense number of its publications through the various missions; and there are also several important local institutions which are engaged in promoting education, and are conducted more or less in a spirit of missionary co-operation. The Society for the Propagation of the Gospel founded a mission college at Calcutta in 1820; and it has established missions in connection with the college in the neighbourhood of Calcutta and Cawnpore. The Society has a seminary at Vepery and a grammar-school. A number of native teachers is expected from these institutions. In the dioceses of Calcutta and Madras 22 missionaries and 11 catechists are employed. In the last Report of the Church Missionary Society it is stated that as respects the extension of Christianity in India the great obstacle is the difficulty of finding willing and competent agents either at home or abroad. Baptist Missions:—At Calcutta, to which six out-stations are attached, with sub-stations in many villages, the missionaries devote

their time to translating and publishing the Scriptures, and improved versions are in progress; and in forming and superintending schools, from many of which native teachers and preachers proceed to aid in the work. A few individuals are annually baptised. Church Missionary Society:—In Northern India, extending from Calcutta to Agra, and including Benares, there are 12 stations, at which fourteen missionaries are employed, two native missionaries, two catechists, forty-one native and Eurasian teachers. Communicants (at Calcutta and Benares) are 32; attendants at public worship 1111; schools 63, scholars 3844, chiefly boys. The bishop of Calcutta states that the education of youth on Christian principles has 'loosened the chains of Hindooism.' The Western Indian Mission has its principal stations at Bombay and Nassuck. Within 12 miles of Bombay 450 children are under instruction; and, as at Calcutta and Madras, there is an institution for the purpose of giving a superior education to young natives who give promise of becoming useful missionary labourers. At Nassuck there are schools for 357 boys and 80 girls. The missionaries endeavour to promote their object by discussions, conversation, and preaching. The South Indian mission includes Cochin, on the Malabar coast, and Madras, with the stations in the Tinnevelly mission:—missionaries employed 11, catechists 4, native missionaries 3, native assistants 151, communicants 314, schools 149, scholars 4634. Of the Palamcottah station it is stated that the congregations are increasing, 'but the new comers are evidently influenced by worldly motives,' and should they be disappointed, they will relapse into heathenism. The conduct of the converts 'differs in very few respects from that of the heathen, except in the outward mode of worship.' The German Missionary Society had recently a missionary in the Tinnevelly district. London Missionary Society:—Principal stations at Calcutta, Chinsurah, Berhampore, Benares, Mirzapore, Surat, Belgaum, Bangalore, Salem, Coimbatore, Trevandrum, Nagercoil, Neyoor, Combaconum, Chittore, Madras, Cuddapah, and Vizagapatam. Number of stations and out-stations 310, missionaries 36, European and native assistants 375, schools 293. These numbers refer to the territories of the East India Company and those of the protected states. It is stated that the natives who become acquainted with English are much more favourably disposed than those who remain ignorant of it. At Chinsurah the people have themselves established English schools under native masters. The mission presses are actively at work, and great numbers of tracts are printed, which are inquired for by people from all parts. In the Coimbatore district, at the commencement of the mission, no schoolmaster could be found who would teach Christian books; now there are 12 boys' schools on Christian principles. The prejudices against female education are rapidly giving way. In the Travancore district, in an area of 450 square miles, about 6000 persons, including children, are connected with the mission. In the seminary for training native missionaries, four of the youths read the Greek Testament with facility. The effects of missions in the district of Chittore are favourably displayed in the habits and conduct of the natives, many of whom, in place of resorting to mendicancy, are engaged in honest labour, but 'spirituality is scarcely visible.' At Madras the native congregation consists of 80 persons, of whom 35 are communicants. General Baptist Missions:—Stations at Cuttack and five other places within 350 miles of Calcutta; 78 communicants, but this number includes Europeans. At Cuttack a printing-press has been set up, at which 10,000 hymn-books, 20,000 tracts, 2000 Baxter's 'Call,' and 4000 'Pilgrim's Progress' have been printed. Wesleyan Missionary Society:—Principal stations at Bangalore, Gobee (a town in the Mysore country), Negapatam, and Madras, each of which embraces an extensive district; missionaries 12, assistant-missionaries 7, salaried teachers 24, members 346, scholars, chiefly Hindus, 1375. The gospel is preached in English, Tamul, Canarese, and Portuguese; and religious instruction has occasionally been given in Telogoo. Church of Scotland Missions:—The nature of their labours has already been described, and statements given showing the great importance of their schools at Calcutta, Bombay, and Madras. The German Missionary Society has four missionaries at Mongalore, and three at Dharwar, and five were sent out last year to establish a mission at Hoobly. In 1837 a seminary was begun for training native catechists and schoolmasters, and was soon attended by 22 young Canarese. American Board of Missions:—In the Mahratta missions 6 missionaries, 2 assistants, and 1 printer are employed. The seminary at Ahmednuggur, supported at an annual cost of 1000 dollars, has about 60 pupils from 5 to 16 years of age, and the course of study embraces several years, and includes the acquisition of English. The English residents are liberal supporters of this institution. At the mission-press, which has been also employed by other societies, 51,450 copies, containing 3,127,850 pages, were printed in 1839 in the Mahratta language. The Tamul mission has stations at Madura and four other places, at which 11 missionaries, 1 medical missionary, 1 physician, and 16 native assistants are engaged. At Madura daily preaching is usually maintained amongst the people at the schools and in the vestibules of the idol temples. The opportunities of instructing the natives are numerous during a journey. When the missionary stops at a school the people assemble out of curiosity, and while seated on his horse he may profitably hold a discourse of from two to ten minutes. In Madura and its vicinity there are 43 schools, containing 1730 scholars, and at Dindegal 17, containing 554 scholars. A small proportion of the people can read, but the population being immense, the number of readers is great. Applications for books are received from the most remote villages. In the district comprehending Madras there are 25 schools, with 750 scholars, and the attendance on preaching varies from 360 to 400. The American Board has recently purchased the extensive printing establishment of the Church Missionary Society at Madras. It contains eight printing-presses, a lithographic press, fifteen founts of type for printing in English, Tamul, and Telagoo, also an hydraulic press, and all the means for casting type and binding books. The Bible has not been completed in Telogoo. In a few years it is expected that the operations of this press will supply the reading population amongst the Tamul people with portions of the Scriptures, tracts, &c. American Presbyterian Mission:—Stations at Loodianah, the most remote of the British stations to the north-west, near the Sutlej, which divides the territories under the power or influence of England from those of Runjeet Singh. There are 2 schools, English and Hindustanee, and 2 printing-presses, under the care of one missionary. Sharanpu, 110 miles distant from Loodianah, is another station of this mission, and was selected on account of the large fairs held at Hurdwar, which are attended by people from every part of Asia except China, amongst whom tracts can be usefully distributed. Persian books and tracts are in demand. Allahabad, the remaining station, is resorted to by immense multitudes of pilgrims from distant parts. At the last account only one missionary resided here, but others have been since sent from the United States to join him.

7. *Ceylon.*—Baptist missions:—Stations at Colombo and five other places. A controversy is carried on with the Roman Catholics, and fifteen numbers of the 'Protestant Vindicator' have been published. Church missions:—stations 4, missionaries 8, printer 1, native catechists and teachers 81, attendants on public worship 2365, communicants 120, schools 55, scholars 1880, chiefly boys. Service is performed in the Tamul and Singhalese languages. Since 1823 above 100 youths have been educated at the mission seminary. The increasing knowledge, experience, and stability of the native agents is regarded as the most promising feature of the mission. Wesleyan Missions:—The Ceylon mission is conducted in two divisions, the Singhalese and the Tamul, the northern part of the island being inhabited by a distinct race professing Buddhism, and the south by Hindu idolaters and Mohammedans. Stations in the Singhalese division 5, missionaries 5, assistant-missionaries 9, salaried teachers 99, members in society 656; scholars, adults, and children, 4471. In the Tamul division there are 4 stations, 8 missionaries and assistants, 37 salaried teachers, 139 members, and 2136 scholars. The missionaries report that regular congregations are established all over the island; thousands of tracts in four different languages are distributed every month, which are said to be eagerly read; schools might be increased to any extent; discussion on religious subjects is almost universal; and the 'entire evangelization' of the island engages the anxious attention of the Society. American Board of Missions:—stations and out-stations 13, missionaries 6, native preachers 4, native assistants 71, physician 1, printer 1, female assistant-missionaries, being the wives of missionaries and the physicians, 7. In sixteen places of worship, average attendance 2700

persons, communicants 330. In 187 free-schools there are 4732 male and 1044 female scholars, besides 151 in the male and 98 in the female boarding-schools. The press gives employment to fifty natives. A few years ago the only tracts distributed were written on the olla, and a single writer could only make four or five copies a-day. In 1837 the number of pages printed, of tracts, of the Scriptures, and other works, was 12,436,000. This mission being in some difficulties in 1837, the governor, in his official capacity, sent a donation of 200*l.*, 'in token of the high sense entertained of the services of the mission in the northern provinces.'

8 *Indian Archipelago.*—In August, 1837, a regulation in reference to foreign missions in these seas was issued by the Netherlands (local) government:—'That no missionary from any foreign country shall be permitted to establish himself anywhere in Netherlands India, excepting on the island of Borneo, this permission to be granted only to Netherlands missionaries, under restrictions hereafter to be made.' The authorities on the west, south, and east coasts of Borneo are called upon 'to advise the government what progress the missionaries have made there, and to give their opinion whether or not it is advisable that more should be admitted.' The Netherlands Missionary Society employs eighteen missionaries in Dutch India. There are two stations at Sumatra, one at Rhio, one near Batavia, also one at Timor Coupang, one at Makisser, and one at Moa; at Litty and Amboyna there are two at each; and there are stations at several other places. In Celebes numerous nominal conversions to Christianity have taken place. In Borneo there are some German missionaries, who have no connection with the Netherlands Society. The Moluccas have not been considered as a profitable field for missions. About twenty years ago the Baptists had a missionary station at Bencoolen, in Sumatra, where a press was put into operation, and many tracts and books distributed; but the missionaries removed to India on the island coming into the hands of the Dutch. The London Missionary Society has a station at Batavia, where two schools have been established for Chinese youths, and one for Malays, and a printing-press has been actively employed. The American Board supports four missionaries at Borneo, and the American Episcopal Missionary Society has a station at Batavia.

9. *Australasia.*—The Church Missionary Society has a station at Wellington Valley, 240 miles north-west of Sydney, where, at different times, more than a hundred of the aborigines have been under instruction. Several have learned to read. The native vocabulary has been revised and enlarged, and the Gospel of St. Matthew, and nearly the whole of the morning and evening services of the Church have been translated. Service is performed in this language every Sunday. 'In the seed-time natives attended at the plough daily for upwards of a month; and in the harvest thirteen natives were employed in reaping. The children, in general, improve as much as those of European parents in all ordinary branches of education—reading, writing, sewing, and religious knowledge.' At Port Philip, in South Australia, the Wesleyan Missionary Society has stationed two missionaries, who are to instruct the aborigines. The local government has undertaken to defray half the preliminary and half of the annual expenses. In 1838 several German missionaries were conveyed out at the cost of the English government, with a view of instituting a German mission to the aborigines. They are stationed at Moreton Bay, and at present act under the Scottish synod of New South Wales. The Gospel Society has engaged to contribute towards the outfit and support of 32 additional clergymen in New South Wales and Van Diemen's Land. The Catholics are extending their activity to the same quarter, and Sydney has become the central station of an important mission, embracing Polynesia. New Zealand:—The Church Missionary Society commenced its labours in these islands in 1815, and there are now 10 stations and 1 out-station, at which 91 persons are employed. Attendants on public worship 2176, communicants 178, schools 51, scholars 1431. In the printing-office 5000 copies of the New Testament have been printed; and a New Zealand grammar, in English, and a translation of the 'Pilgrim's Progress,' are preparing. Dr. Lang, in his 'New Zealand in 1839,' has severely attacked the members of the Church Missionary Society on account of their having become land-jobbers. Mr. Polack, who resided in New Zealand six years, says that but for the missionaries the island would have been wholly unsafe as a residence for commercial men. The missionaries, in the absence of a regular government, are often required to exercise political and magisterial power. (*Report of Commons' Committee on Aborigines.*) The Wesleyan Missionary Society is the only other English institution which sends missionaries to New Zealand. Members 600; 500 are under school instruction; a printing-press is in full operation, and employed in preparing elementary books for the schools. New Zealand has just been visited by Catholic missionaries, who say, 'The natives are enchanted with the beauty of our ceremonies.'

10. *Polynesia.*—Wesleyan Missions:—Stations in the Friendly Islands and in the Fejee Islands. In the Habai and Vavou Islands the people have 'generally embraced the true religion.' They are said to be 'truly converted,' and living in the enjoyment of 'great spiritual peace.' London Missionary Society:—The missionaries of this Society occupy stations in the Navigators' Islands, Georgian Islands, Society Islands, and Harvey Islands. The American Board of Missions has selected the Sandwich Islands. The Rev. H. Douglas states that in more than thirty islands of the South Seas paganism has ceased to be the national faith. (*Travels in Eastern Asia.*) Ellis's 'Polynesian Researches' contains an interesting account of the progress and results of missionary exertions in this part of the globe. A 'History of the Sandwich Islands Mission' has been published by the London Tract Society, in 1 vol. 12mo.

11. *Guiana and the West Indies.*—Baptist Missionary Society: Jamaica—19 missionaries, 42 male and female assistants, 69 stations and out-stations, 18,720 members, 17,781 inquirers, 2447 day-scholars, 992 evening-scholars, 7464 Sunday-scholars, 2120 baptisms, and 382 new communicants in the year. Bahamas—4 missionaries, 13 assistants, 36 stations and out-stations, 360 members and 50 inquirers, 200 day-scholars, 450 Sunday-scholars. Church Missionary Society:—stations 27, missionaries 12, catechists and teachers 23, country-born teachers 18, attendants on public worship 2005, communicants 88, schools 54, scholars 3712. Of the stations of the Society many are in the most neglected parts. Wesleyan Missionary Society:—85 missionaries are assisted by 1159 salaried and 1582 gratuitous teachers; the members in society are 40,234, and the number of scholars is 16,027. In 1838 assistance was obtained from the government towards building 24 school-houses. United Brethren's Missions:—at 29 stations there are 125 male and female labourers, who have 43,892 persons under instruction, of whom 13,952 are communicants. In 1838 the Brethren received assistance from government for the erection of 19 schools. The Scottish Missionary Society has 5 missionaries employed. The means of education will soon be more generally extended amongst the negroes in the West Indies than in the United Kingdom. The Ladies' Negro Education Society has established 120 schools during the last fourteen years. In Jamaica, under the Mico Charity, there are three model-schools, for boys, girls, and infants. The greatest difficulty exists in supplying competent teachers. The Gospel Society makes large grants towards the erection of schools and churches; and 42 clergymen derive a part of their income from its funds.

12. *North American Indians.*—American Board of Missions:—27 stations, 23 missionaries, 3 medical missionaries, 3 physicians, 11 teachers, 6 farmers and mechanics, 3 native preachers, 1 native assistant, and 55 native assistants. United Brethren's Mission:—About 360 Delawares and Cherokees are under the care of eight missionaries and one assistant. The Church Missionary Society has at the Red River settlement 4 churches, 1 missionary, and 7 schoolmasters; attendants on public worship 1560, communicants 267; at 10 schools there are 649 scholars, including 60 youths and adults. 'The plough, the spade, the sickle, and the mill, are very essential articles in this mission.' The Wesleyan Missionary Society has missions among the Chippewa and Mohawk Indians. The American Episcopal Missionary Society is labouring amongst the Indians. In the Report of the American Episcopal Board it is stated that the government at Washington is about to congregate the remnant of twenty-eight Indian tribes, about 130,000 in number, in a district 200 miles by 600 in extent, the exclusive possession of which is to be secured to them.

The North American Colonies are greatly indebted for the means of religious instruction to the Gospel Propagation Society, and in every one of the British provinces it has gathered congregations together. In Newfoundland the Catholics have an active mission.

13. *Labrador.*—Fifteen of the United Brethren have 973 Esquimaux under their care, among whom there are 360 communicants.

14. *Greenland.*—At 5 settlements, 15 of the United Brethren have 1785 natives under their care, including 80 communicants.

For a 'General View of the Results of Missionary Effort,' the reader may refer to the Rev. Howard Malcolm's *Travels in South-Eastern Asia.* Briefly stated they are as follows:—1. Numerous and formidable impediments have been removed. An entrance and location among strange nations have been effected. Missionaries everywhere find brethren to welcome them. 2. One thousand ordained missionaries, fifty printers, three hundred schoolmasters and assistants, and above one thousand native preachers and catechists are in actual service. 3. The Scriptures, in whole or in part, have been translated by modern missionaries into nearly a hundred languages. 4. A considerable number of languages have been reduced to writing. For some of them characters have been invented. In most of them a considerable number of the people have been taught to read. 5. Missionaries have given to the heathen nearly all the useful literature they possess. They have, with a few exceptions, been the introducers of the art of printing amongst them. 6. Tracts and practical works have been produced in considerable variety: in Bengalee 75 tracts and other works; in the Tamul language 200, in Malay 50, in Chinese about 100, in Burman 28, &c. &c. 7. In nearly every mission there have been prepared a grammar, vocabulary, and dictionary. 8. An amount literally incalculable of Bibles and tracts has been put into circulation. 9. Great mechanical facilities have been created. Upwards of 41 printing-offices are in full operation in heathen lands, some having 10 presses at work. Binding establishments are in connection with these; and the natives have learned the arts of printing and bookbinding. 10. Schools, some of them for superior education, have been established in vast numbers; the number of children in missionary schools is estimated at 3000. 11. The blessings of Christian morality have been widely diffused. 12. In some places the entire fabric of idolatry is shaken. Mr. Malcolm estimates the present number of converted heathens at above 100,000.

(*Missionary Map of the World;* Wyld's *Map of Missions; Missionary Register* for January, February, March, and April, 1839; *The Missionary Vine; Missionary Gazetteer,* by the Rev. C. Williams; &c. &c.)

MISSISSIPPI (or the 'Great Water,' as the term signifies in the native language), is one of the largest rivers on the globe, which drains, with its numerous branches, a surface of about 1,100,000 square miles, and probably not less than one-fifth of the North American continent.

Its basin extends from 29° to 50° N. lat., and from 77° to 111° W. long. It is widest on the west, averaging from north to south, and west of 90° W. long., about 1200 miles, whilst its average width east of 90° W. long. does not exceed 560 miles. The greatest length of the basin from east to west is near 42° N. lat., where it measures nearly 1500 miles. Its basin comprehends, besides the immense tract of country along its western and north-western border, still in possession of the aboriginal tribes, the territories of Iaway, on the west, and that of Wisconsin, on the east of the Mississippi; and also the states of Missouri, Arkansas, and Louisiana, on the west; and those of Illinois, Indiana, Ohio, Kentucky, and Tennessee, on the east of the river. It also contains the larger portion of the state of Mississippi, and parts of Alabama, Georgia, North Carolina, Virginia, Pennsylvania, and New York.

The sources of this river are two small lakes, situated in 47° 10′ N. lat., and between 95° 30′ and 96° W. long. The western, called Lake Itasca, is about eight miles long; the eastern, Usawa Lake, is hardly two miles in length. These lakes are estimated to be about 1500 feet above the level of the sea. From each of these lakes a small stream issues in a northern direction, which unite, after a circuitous course of 50 or 60 miles, in 47° 38′ N. lat. The united stream falls into Lake Travers, which is about 12 miles long from north to south, and six or seven broad, and is the most northern point attained by the river. Issuing from the eastern side of this lake, the river flows south-eastward to Cass Lake. From Cass Lake it still runs in an eastern direction to Little Winnipeg Lake, from which its south-eastern course begins. Up to this point its course lies through a country studded with lakes, and united with each other by channels full of rapids and small cataracts. The surrounding country consists of an alternation of small eminences and swampy ground. The elevations or ridges are composed of diluvial sand, on which large granite boulders are scattered, and are overgrown with pine-trees. In the swampy ground other trees grow, especially hemlock, elm, and ash, which are covered with moss. In some parts small prairies occur The bed of the river is lined by sandy hills, and its waters run over rocks of primitive formation: its course is often impeded by boulders.

Issuing from Lake Winnipeg in a southern direction, the Mississippi continues to traverse the region of lakes. The country in which this part of its course lies is similar to that about its source. The river itself continues to flow with great velocity, and forms several small falls. In some places the river is skirted by narrow strips of alluvial soil, subject to inundation, and in others its bed is already wide enough to form islands, especially above the Big Falls, where twenty islands occur in the space of four miles, called the Beaver Islands. Nine miles above the place where the Mississippi is joined by its first great affluent, the St. Peter's river, which falls into it from the west, occur the largest cataracts in the river, called St. Antony's Falls. The Mississippi, though considerably narrowed by the rocks, is about 640 yards wide at this point. In the middle is an island about 100 yards wide, and covered with trees. The fall on the eastern side is 230 and that on the western 310 yards wide, and the perpendicular height 16 feet. There is a considerable rapid both above and below the falls, and goods must be carried over a long portage. The difference of level between the places of disembarking and reloading is fifty-eight feet. For several miles farther down rapids occur. The falls of St. Antony may be considered as the point where the Mississippi terminates its upper course.

From the Falls to Lake Pepin the river winds through a country of prairies, whose surface is rather undulating than hilly, the elevations being of moderate height, and seldom attaining 200 feet above the level of the water. The valley through which the river runs is now more regular and uniform in width; but the river itself is winding, and intersected with several small islands; its channel is also impeded by sand-bars, and the current is rapid. At Lake Pepin commence the bluffs, or wall-like high grounds, which generally run parallel to the course of the river, and at some distance from it. Lake Pepin, in most parts, nearly fills up the whole space between the bluffs, which rise about 450 feet above its level. The lake is about 21 miles long from east-south-east to west-north-west, and its breadth varies between one and three miles. The country at the back of the bluffs is rather undulating, and assumes the character of a prairie land, being only wooded in isolated spots. Below Lake Pepin the vale of the Mississippi varies from 3 to 10 or 12 miles in width, except at Rock Island and Des Moines Rapids, where it is only wide enough to receive the volume of the river. At the Rock Island rapids, which occur a short distance above the mouth of Rock river, the bed of the Mississippi is contracted to 800 or 1000 yards; and at the Des Moines rapids, which are near the mouth of the Des Moines river, it is only 1000 yards wide. At Rock Island Rapids the river descends 44 feet in a distance of 15 miles; and at Des Moines Rapids 30 feet in 11 miles. In many places the river occupies half the vale, spreading out to the width of five or six miles, and appearing to lose itself among numberless islands, between which it runs in narrow channels. Between Lake Pepin and the mouth of the Missouri not less than six hundred and forty islands of considerable size have been enumerated, which are formed of the alluvium brought down by the stream, and are chiefly sandy; many of them are covered with a vigorous vegetation. The vale of the river is bounded by high bluffs, which are generally abrupt, and often precipitous. Below Lake Pepin the bluffs are said to be 700 or 800 feet high; at the mouth of the Wisconsin river they are 400 or 500; but near that of the Illinois, only from 100 to 150 feet high. These bluffs are intersected by numerous deep ravines and watercourses, which give the country a hilly and broken aspect. On the western side of the river, above the mouth of the Wisconsin, forests cover the high grounds to the distance of six or eight miles from the river: behind them is a prairie region of great extent. The vale itself has a level surface; but in some places, and especially in the vi-

cinity of Lake Pepin, isolated knobs and hills of considerable magnitude, based upon horizontal strata of rocks, and rising to various heights, frequently occur. These hills appear to be the remains of the elevated tract through which the river has scooped out a broad and deep vale. This level is covered with an alternation of prairies and forests. The prairies are generally elevated a little above the floods, and richly carpeted with herbage and flowers: the woodlands are subject to inundation, and sustain a dense and heavy growth of trees. Between the Falls of St. Antony and the mouth of the Missouri river the Mississippi receives no considerable affluent from the west, except the St. Peter's river; from the east it is joined by St. Croix, Wisconsin, Rock, and Illinois rivers. At the mouth of the Missouri the middle course of the Mississippi terminates.

Below the mouth of the Missouri, the river and the vale through which it flows present different features. The river, though less in width, has a more imposing aspect, flowing with a comparatively gentle course, in one sheet of water, rarely interrupted by islands. The only serious obstruction to navigation occurs about 30 miles above the mouth of the Ohio, where two bars of limestone, called the Big and the Little Chain, extend across the bed of the river. In the low state of the river these bars have little water on them, which circumstance, added to the rapidity of the current, renders the ascent of vessels very difficult. The vale widens more and more as it proceeds southward. It consists of an alternation of high lands with an undulating surface, and of low bottoms partly covered with swamps. Both are of great extent, and are generally opposite to one another, so that when the high ground approaches the banks of the river on one side, extensive bottoms skirt them on the other side.

The most northern of these bottoms, called the American Bottom, begins four miles above the mouth of the Missouri, on the eastern bank at the Piasa Hills, and extends to the mouth of the Kaskaskia river, a distance of seventy miles in a straight line. It is several miles wide, and has a soil of astonishing fertility, consisting of comparatively recent deposits from the river. Its surface however slopes, as is commonly the case with bottom-land, from the river to the high lands which skirt the bottom on the east, and along the foot of these high lands are pools of stagnant water, which render this fine bottom unhealthy. Opposite this bottom, on the west side of the Mississippi, the high lands approach the river, presenting abrupt declivities, prominent points, and in many places perpendicular precipices from one to two hundred feet high. The country at the back is partly wooded and partly prairie. These high lands continue along the right bank of the Mississippi somewhat farther than Cape Girardeau, north of which place they attain their greatest elevation, which is 350 feet. Between the mouth of the Kaskaskia river and that of the Ohio are also high lands of inferior elevation, but about thirty miles above the mouth of the last-mentioned river the banks begin to be low, and continue so to its very mouth. Its soil consists of recent alluvium, and is covered with dense forests: the width is about 10 miles.

This low alluvial tract continues south of the mouth of the Ohio for about seventeen miles, where the river runs at the base of the Iron Banks, which rise nearly perpendicularly about 130 feet above the level of the river, and are annually wearing away by the action of the water, which sets strongly against them. From the Iron Banks southward, bluffs less than 200 feet high skirt the banks of the river as far south as 35° N. lat., with the exception of a bottom-ground about 30 miles long and from three to four wide, which lies between 36° 30′ and 36° N. lat.; it is a swamp covered with high trees, and hence called Wood Swamp. South of it some bluffs attain an elevation of 200 or 300 feet, especially the four hills called the Chickasaw Bluffs. The country opposite to this high bank, on the west side of the river, is low. It begins on the north, about ten miles below Cape Girardeau, with the Tywapatia Bottom, a fine tract of wooded country, and extends to the mouth of the St. Francis river, a distance of more than 160 miles in a straight line. Its width is more than fifty miles, and its western side is skirted by bluffs of moderate elevation, which, for a considerable distance, run along the western banks of the Black and White rivers, nearly parallel to the Mississippi. This extensive tract is traversed in all its length by the St. Francis river, which is joined not far from its source by an offset of the Mississippi, by which, during the time of the freshets, a great volume of water is poured towards the middle of the plain, so that the greatest part of it is inundated, and a considerable extent is a swamp all the year round. This swampy tract, extending on both sides of the St. Francis river, is called the Great Swamp. The country is unhealthy, and covered with a continuous forest.

On the south, this low region borders on another, which is not much more elevated, but is less subject to inundations. The whole tract extending from the mouth of the St. Francis river to 33° N. lat. is quite level, without any elevations, and does not form bluffs along the banks of the Mississippi. It is covered with recent alluvium, and mostl wooded. Its width may be between 30 and 40 miles; and on the west it borders on a more elevated hilly region covered with pine-forests. Opposite to this region, on the left bank of the Mississippi, is an immense swamp, which may be called the Chocktaw Swamp, as that nation was in possession of the widest part of it. This swamp extends from opposite the south of the St. Francis river to that of the Yazoo river, a distance of about 150 miles, with a width of about fifty miles in the middle, where it is widest, and an average breadth of about thirty miles. It seems to owe its origin to an offset of the Mississippi, which branches off about 20 miles above the mouth of the St. Francis river, and runs through the low country in a southern direction. This branch is called, at least in its lower course, False river, and falls into the Yazoo river about 20 miles from its mouth. This low region is generally swampy and impassable, and it is only along the watercourses which flow through it that the banks are dry for several months in the year. On the east it is bordered by a much more elevated tract, which is generally wooded on its margin, but farther inland extends in wide and open prairies.

South of the mouth of the Yazoo river, the bluffs on the eastern bank of the Mississippi re-appear, and extend south of Baton Rouge (about 30° 30′ N. lat.). In some places very narrow tracts of low inundated ground separate the bluffs from the bed of the river, but their base is generally washed by its waters. As in the other bluff region, the surface of this tract is intersected by numerous watercourses, which give to it the aspect of a hilly country; but at the distance of about 10 miles from the river it extends in an undulating plain. The bluffs themselves rise rather steeply from 100 to 200 feet above the bed of the river. Opposite to this bluff region is another low and generally swampy tract, which is traversed by the Tensas river, another outlet for the superabundant waters of the Mississippi during the floods. It is from 20 to 30 miles wide, beginning north of 33° N. lat., and extending southward to the mouth of the Red River and the efflux of the Atchafalaya branch of the Mississippi, where it is connected with the extensive low regions of the delta. This region, as well as the delta itself, which constitutes the most southern portion of the vale of the Mississippi, is more particularly described under LOUISIANA.

The Mississippi falls into the Gulf of Mexico by six mouths, after a course of more than 3200 miles; but if we consider the Missouri as the principal river, the whole course is at least 4400 miles.

Countries constituting the Borders of its Basin.—The basin of the Mississippi, like that of most other rivers, is narrow near its mouth. As far north as the beginning of the bluff region, near Baton Rouge, it is confined to the inundated region of the delta. On the west of the delta are the extensive and elevated prairies of the Attacapas and Opelousas, from which the low country is separated by a fertile and sloping tract. But towards 31° N. lat. the country along the border of the basin begins to be more uneven, and is covered with pine-forests. North of the road leading from Nacogdoches in Texas to Nachitoches in Louisiana the change is still greater, the surface in those parts being much more broken, and intersected with hills several hundred feet high. Near the parallel of this hilly region the basin of the Mississippi widens greatly towards the west, running along the parallel of 33° N. lat. from the sources of the Sabine river, or from 98° W. long., to the sources of the Red River in the Rocky Mountains, or to 105° W. long. The country which separates the Red River from the numerous rivers which descend into the Gulf of Mexico through the province of Texas, is only hilly and wooded about the sources of the Sabine river; farther west it has the form of an earth-wall several miles wide, mostly level on its surface, without trees, and sloping with rather a gentle declivity towards the Red River. Its elevation

above the sea is not known: towards the western extremity, about the upper branches of the Red River, it joins the wooded hills of St. Saba, a branch of the Rocky Mountains. From the source of the Red River, the long and continuous chain of the Rocky Mountains forms the western border of the basin of the Mississippi in all its extent, from 33° to 48° N. lat. [ROCKY MOUNTAINS.] As these mountains run in a north-west direction, the western part of the basin of the Mississippi continually widens as it extends northward. Near the parallel of 33° N. lat. the river is only about 550 miles from the western border of its basin, but near 44° N lat. it is 1000 miles from it. Farther north the distance is somewhat less, as the river in these parts flows in a general south-eastern direction.

The northern border of the basin of the Mississippi begins on the west at the base of the Rocky Mountains, and the most southern branch of the river Saskatchevan about 48° N. lat. It does not run directly east, but in a north-eastern direction until it attains 50° N. lat., when it extends nearly along that parallel eastward to the banks of Assiniboine, a distance of 400 miles. In 101° W. long. it turns to the south-south-east, and continues in that direction to the sources of the Red River of Lake Winnipeg (about 45° 30′ N. lat.) in Lake Travers. Hence it turns to the north-east on the eastern side of the Red River to Lake Itasca, the source of the Mississippi and Lake Travers, and continues in that direction to 48° N. lat., along which it extends to the banks of Lake Superior. Lakes Superior and Michigan may be considered as lying on the margin of the basin, as the rivers which empty themselves into these lakes have a very short course. From the southern extremity of Lake Michigan the margin of the basin runs east to the most southern extremity of Lake Erie, whence it continues at a short distance from the southern shores of that lake nearly to its eastern extremity. From this lake it turns east-south-east, and terminates at the base of the Allegheny Mountains between the sources of the rivers Alleghany and Genessee, near 42° N. lat. This northern border extends from 110° to 78° W. long., a distance of nearly 1400 miles in a straight line. It is remarkable that no part of such an extensive line is formed by a mountain-range, or what with propriety could be called so, though the countries lying along it present a great variety of natural features. The most western portion of it, which separates the rivers that fall into the Missouri on the south, and into the Saskatchevan on the north, and extends as far east as the Mandan villages (100° W. long.), is a vast plain uninterrupted by any elevations. It is destitute of wood and water, and the few springs which occur are generally salt. This tract however furnishes excellent pasturage. The bottoms along the large rivers are from half a mile to two miles wide, and from 150 to 300 feet below the surface of the plain, whose edges are steep. The soil of the bottoms is alluvial, but not generally very fertile. This tract is probably more than 3000 feet elevated above the sea-level. Where the basin of the Mississippi turns to the south and runs parallel with the course of the Missouri river below the Mandan villages, its border is formed by a wide expanse of elevated ground, which has received the name of Coteau des Prairies. It begins on the north near 49° N. lat., not far from the banks of the Assiniboine, and runs south-south-east, between 99° and 98° W. long., along the vales of the Red and St. Peter's rivers. Its elevation is about 1000 feet above the level of the adjacent country, and its breadth is said to be more than 50 miles. It presents a rounded summit, with few irregularities of surface, and is for the most part destitute of trees. At both extremities this huge mass of elevated ground disappears in a multiplicity of hills, which give to the country a highly varied aspect.

East of the Coteau des Prairies, and at a distance of about 25 miles from its base, a valley runs in the direction of the elevated tract from south-south-east to north-north-west. In this valley are the sources of Red River of Winnipeg lake, and of St. Peter's river. The former is the outlet of Lake Travers, and the second of Big Stone lake. The space between these two lakes is but little elevated above their level, and the water has been known in time of flood to rise and cover the intermediate ground so as to unite the two lakes. In fact, both these bodies of water are in the same valley, and it is within the recollection of some persons that a boat once floated from Lake Travers into St. Peter's river. One of these rivers empties itself into Hudson's Bay, 57° N. lat., and the other into the Gulf of Mexico, 29° N. lat. They rise in the same valley, within three miles of each other. (Long's *Expedition to the Source of St. Peter's River.*)

On the east of the valley of Red River of Winnipeg lake, and between it and the upper branches of the Mississippi (Itasca river and R. de Corbeau), the prairies of the western side become a swampy ground, which is traversed from south to north by a somewhat elevated ridge of diluvial formation, consisting of oceanic detritus. This region, whose surface is partly occupied by numerous lakes, extends to the north of Lake Cass and Lake Little Winnipeg. It is from 1300 to 1500 feet above the sea-level, and contains the sources of many rivers which join the Mississippi, of St. Louis river of Lake Superior, which is considered as the source of the St. Lawrence river, and of several rivers which fall into Great Lake Winnipeg and Red River. The rivers which thus run off in different directions have their heads and upper courses so near to one another, that the Indians and traders constantly pass in their canoes from one to another.

Most of these rivers rise or flow at a distance not exceeding 100 miles from the western extremity of Lake Superior, and many of them approach much nearer: their beds also are more than 600 feet above the surface of the lake. They are however prevented from flowing into it by a rocky tract which surrounds that extensive sheet of water on all sides. Between 48° and 49° N. lat., this rocky, barren, and rugged region extends from the shores of Lake Superior westward to the vicinity of Great Lake Winnipeg, more than 300 miles. But a degree farther south (47° lat.), it is hardly 60 miles wide from east to west. Though it descends with a precipitous declivity towards Lake Superior, its level is probably very little elevated above the swampy tract in which the upper branches of the Mississippi rise. Its surface, which is extremely broken, consists mostly of naked rock, with a few patches of thin soil, and is overgrown with scrubby trees and bushes.

The country extending along the southern shores of Lake Superior, on the borders of the basin of the Mississippi river, is of a similar character. With the exception of the tracts adjacent to the embouchures of the small rivers which fall into it, and a few other places, the rocks along the lake rise from 200 to 400 feet above its surface, and in some places to 800 or even 1000 feet. Farther inland they also rise somewhat, but are followed by an extensive table-land of a very broken and diversified surface, interrupted by numerous large lakes, as the Tomahawk lake and others. This broken region, to which the name of the Wisconsin Hills is given, is probably more than 1200 feet above the sea-level. The rivers which rise on it, and run off towards all points of the compass, are separated from one another by short portages, but are not navigable to any extent on account of the rapidity of their current. Though wooded in many places, the tracts consisting of bare rock are very extensive. This region terminates on the south-west with the Ocooch Mountains, which occupy the tract between the Mississippi and Wisconsin, one of its affluents; but towards the shores of Lake Michigan it descends gradually, or perhaps in terraces, as the small lakes seem to indicate, which occur at certain distances from Lake Michigan. On the south side of this more elevated region, and probably along its base, a deep depression runs across the country lying between the eastern banks of the Mississippi and Lake Michigan, in a south-western and north-eastern direction. In this depression run two rivers, the Wisconsin, falling into the Mississippi, and Fox river, which empties itself into Green Bay in Lake Michigan. These two rivers are separated from one another by a portage of about one mile and a half across a flat meadow, which is occasionally subject to inundations, at which time it offers a water-communication between the two rivers.

South of Green Bay the border of the Mississippi basin is in no place more than 30 miles from the shores of Lake Michigan. As far as it is known, it consists of prairie land, mostly with a level surface and a shallow soil, which in some few places supports a few scrubby trees. In some places it is separated from the lake by a margin of low, flat, and swampy ground, thickly covered with high grass; but the lake is generally skirted at a distance of a few hundred yards from its shores by a range of steep low sand-hills. The sand is loose and unconnected, and the hills appear to have been produced by the constant accumulation of sand blown from the beach by the strong north-easterly winds.

The line which constitutes the border of the basin of the Mississippi between Lake Michigan and Lake Erie is some-

what curved to the south. Along the western part of this line is a fine level plain covered only with thick grass: it is followed by a deep depression, the surface of which is swampy, and through which two small streams run, which establish a water-communication between the Kankakee river, an affluent of the Illinois, and the St. Joseph's river, which falls into Lake Michigan. Farther east the country spreads out in extensive prairies, almost destitute of timber, except on the bottoms of the watercourses (Elkheart river) and on the banks of the small lakes or ponds with which these plains are intersected. These prairies contain a great number of sink-holes or conical depressions of the surface, from 8 to 10 feet deep, and from 20 to 30 feet in diameter. Between these prairies and the most western bend of Maumee river stretches a country 30 miles wide, consisting of low flat ridges, the summits of which present extensive levels, intersected with many small lakes and lagoons. They rise abruptly and with a steep declivity from the lower country to an elevation of 20 or 30 feet, and are uniform in height, but of unequal breadth. They are divided from each other by narrow strips of prairie land. The soil of the ridges is poor and gravelly, and covered with a thin growth of scrubby oak: it consists of an antient diluvial formation, which has been divided by valleys of a later origin, and these lower grounds are filled with alluvium. The remainder of the border, which skirts the southern banks of the Maumee river, is generally a swampy plain.

The swampy country ceases at Sandusky Bay. The southern shores of Lake Erie rise to some elevation above its level, and are not swampy. Behind them the country rises gently, and with a rather level than undulating surface, and attains at the watershed between the rivers which fall into Lake Erie and those which join the Ohio an elevation of more than 900 feet above the sea, and about 350 feet above the surface of the lake. The high grounds extend in alternate prairies and woodland, and the bottoms along the watercourses, which are considerably depressed below the plains, are of moderate extent and wooded. Swampy tracts are of rare occurrence on the plains. This country continues eastward to the boundary-line between the states of Ohio and Pennsylvania. The remainder of the northern border of the Mississippi basin, which surrounds the numerous upper branches of the Alleghany river, runs close to the shores of Lake Erie to 42° 30′ N. lat., and then turns south-east, terminating where the parallel of 42° traverses the Alleghany Mountains, at the head of Genessee river. The country adjacent to this border is very hilly, consisting altogether of a succession of elevated ridges and valleys. The whole tract is considerably elevated above the level of the sea, as Pittsburg, which lies near its southern extremity, at the confluence of the Monongahela and Alleghany rivers, is 265 feet above the level of Lake Erie, and the country which constitutes the watershed in this part probably rises 300 or 400 feet higher. This tract is almost entirely covered with forests.

The eastern border of the basin of the Mississippi, between 42° and 35° N. lat., is formed by the Appalachian Mountains, which as they extend from north-east to south-west continually approach nearer to the bed of the river. Hence the outer border of its basin, between 40° and 42° N. lat., is about 500 miles from its bed, but at the parallel of 35° N. lat. that distance is reduced to about 250 miles. [For the natural features of this region see APPALACHIAN MOUNTAINS.] Though the Appalachian Mountains cease to constitute a mountain-chain in the north-eastern part of the state of Alabama, a tract of elevated and hilly country branches off from their southern extremity, to the west-south-west and west, and terminates on the banks of the Mississippi, north of the Choctaw Swamp, in the hill called the Fourth Chickasaw Bluff. This hilly tract is mostly covered with pine forests, and resembles the country which extends from its southern declivity to the shores of the Gulf of Mexico. About fifty miles from the river this hilly range is traversed at right angles by another tract of elevated ground, which extends from about thirty miles south of the mouth of the Tennessee river, southward through the middle of the state of Mississippi, and terminates in a long slope near the northern shores of the lakes Pontchartrain and Borgne, which belong to the delta of the Mississippi. This elevated ground is broken and rocky between the Tennessee and Mississippi; but in the state of Mississippi it extends in wide plains, which towards the north exhibit extensive prairies and towards the south are covered with pine forests. In this part the outer-border of the basin of the Mississippi is less than a hundred miles from the bed of the river.

Countries included within the Basin of the Mississippi.—The countries comprised within this basin may be divided into the hilly country, the prairie country, and the desert. The hilly country borders on the east on the Appalachian Mountains, from the base of which it extends westward to the meridian of 96°, being crossed nearly in the middle by the Mississippi and the swampy bottoms adjacent to its bed. Towards the south this region extends to the very borders of the basin, namely, east of the river to 35° N. lat., and west of it to between 33° and 34° N. lat. Its northern boundary, east of the Mississippi, is formed by the Ohio river, and west of it by the Missouri, as far as its confluence with the Kansas river, when the latter river forms its boundary nearly to the place where its two great forks unite. The prairie region occupies the whole of the basin north of the Ohio, and also the country between the Mississippi and Missouri. The desert occupies the western portion of the basin, extending from the meridian of 96° and from the banks of the Missouri, where this river flows in a southern direction, to the base of the Rocky Mountains. We shall notice these regions briefly.

The eastern portion of the hilly region, or that which lies between the Appalachian Mountains and the vale of the Mississippi, varies in its natural features and in fertility. The eastern districts, extending as far west as 86° W. long., have a very uneven surface, which is cut by the watercourses to a considerable depth. The rivers run in deep trenches, and have seldom a bottom of any extent. They flow from 100 to 300 feet below the adjacent country. The upland country is a continual succession of ascents and descents, but the acclivities are gentle, and the whole region is covered with a good soil, loaded with timber in its natural state, and yielding rich crops when cultivated. To the west of 86° W. long. the level of the country sinks considerably, which is shown by the rivers traversing wide and open valleys separated from one another by regular ridges of low hills; but the soil of this portion is inferior, and there are several tracts, though none of comparatively great extent, which are without trees, and partake in some measure of the character of the prairies. Towards the banks of the Mississippi the hills decrease in height and expand in width, but to the very edge of the water the country has a broken aspect. The fertility of this portion is still less, and several tracts are covered with sand, and a few are swampy.

On the west of the Mississippi, the hilly region commences near the banks of the river in the districts which extend from the confluence of the Mississippi and Missouri downwards to Cape Girardeau, but farther south it retires to an average distance of 60 or 70 miles from the river. Probably one half of this region is occupied by the Ozark Mountains and their declivities. The Ozarks with their offsets occupy a space of about 100 miles in width and 400 miles in length, beginning on the south on the banks of the Red River between 94° and 97° W. long., and stretching in a north-eastern direction to the confluence of the Mississippi and Missouri rivers, where they terminate between 90° and 92° W. long. Their general direction is parallel to the Atlantic coast and the Appalachian chain. The highest part of this region lies towards the southern extremity, where, between the Red and Arkansas rivers, they constitute a continuous mountain-ridge rising about 2000 feet above their bases. This ridge is called the Masserne Mountains. The hills which occupy the remaining part of the mountain-tract are much lower, but highest along its western border, where they likewise form a ridge which terminates on the banks of the Missouri, between the Gasconade and Osage rivers, in hills hardly 200 or 300 feet above the bed of the river. The whole surface of this tract, with the exception of the river bottoms and valleys, is occupied by hills and mountains, rising from 500 to 1500 feet above their base, consisting of numerous knobs and peaks, with rounded summits and perpendicular cliffs and abrupt precipices. The soil is poor and only bears pine-trees, cedar, scrub-oaks, and hickory. The valleys have a rich soil, but are occasionally subject to excessive floods brought down from the hills and mountains. These floods are so sudden and great, that sometimes the water has risen, in the course of one night, more than 20 feet, and inundated the whole valley to the depth of 10 or 12 feet. The southern and northern districts of this region, namely,

those adjacent to the Red River and the northern banks of the Arkansas, and those which extend from Cape Girardeau along the Mississippi and Missouri to the mouth of Gasconade river, as well as a tract west of the mouth of the Osage river, an affluent of the Missouri, are not hilly, but the surface exhibits broad and elevated swells of land separated from each other by wide and deep valleys. These districts are diversified with woodlands and prairies. The soil, though not of the first quality, is generally good. The country west of the Ozark Mountains, as far as 96° W. long., resembles these districts in its surface, but the soil is much inferior; the proportion of forest is very inconsiderable, and the timber of a scrubby character. At least nineteen-twentieths of its area are occupied by prairies.

We pass to the prairie-region. Though prairie land generally prevails in that portion of this region which lies east of the Mississippi, there are extensive tracts without any prairies. Of this description is the country which extends along the northern banks of the Ohio river, and in some places 60 or 70 miles from it. It may be considered as divided from the prairies bordering on the north of this tract by a line beginning on the Mississippi river at Cape Girardeau and running in a north-easterly direction to the Miami river, and thence eastward to the Muskingum, which it crosses near Zanesville: thence its course is north-east to the sources of Big Beaver river and to Lake Erie. The tract of country included by this line and the vale of the Ohio is exceedingly diversified with hills and valleys. At the distance of half a mile to one mile and a half from the Ohio the hills rise with a steep ascent to an elevation varying between 300 and 500 feet. On attaining this elevation the country appears uneven and rough, but the hills are comparatively small, though very steep. Their summits have a tabular form. The undersoil is generally either limestone or sandstone. The general elevation of the upland grounds may be from 600 to 1000 feet above the sea-level, but this elevation decreases towards the Mississippi. The inequalities of the surface do not render it unfit for cultivation. The valleys, especially along the principal streams, are exceedingly fertile, and the hills, though less productive, are capable of cultivation.

The country north of the above-mentioned line has an undulating surface towards the east, but no considerable hills occur. This district is entirely covered with forests. The prairies begin to make their appearance on the banks of the Muskingum river, where however they are frequently interrupted by forests, but farther west the prairies increase in number and extent, until in the neighbourhood of the Mississippi the forests are limited to the banks of the rivers. In these districts extensive tracts occur with scarcely an undulation upon their surface. They are generally dry, and water is only found at a considerable depth, but towards the border of the basin of the Mississippi the extensive levels are marshy. The tract of land in which the rivers, which on one side fall into the Ohio, and on the other into the lakes Michigan and Erie, take their origin is lower than the country south of it, and decreases in elevation as it advances westward, being at the source of the Miami 964 feet, and between Lake Michigan and the upper branches of the Illinois river only about 700 feet above the sea-level. The valleys of the rivers in this prairie-region are generally broader than among the hills farther south, and more regularly defined, being separated from the high lands by parallel ranges of bluffs or mural banks.

The prairies extend between Lake Michigan and the vale of the Mississippi northward to the lower course of the Wisconsin river (43° N. lat.). North of that line commences a hilly region, which extends northward to Lake Superior. This region, which is known by the name of the Wisconsin Hills, has been already noticed. The Ocooch Mountains, which constitute its southern extremity, rise about 1200 feet above the Mississippi, and 2000 feet above the sea-level, and near the great bend of the Wisconsin, but on the south-east of it is an isolated mountain-mass called the Smoky Mountains, which rise to the height of 1500 feet. The country which extends south of this region contains a greater proportion of forest than that on the banks of the Illinois river.

On the west of the Mississippi, about the sources of that river and of its affluent the St. Peter's, extends that swampy region of lakes which we have already noticed. South of it, and as far west as the Coteau des Prairies, the general surface of the country, which is about 100 feet above the river bottoms, is undulating. In many places tracts occur of moderate extent, covered with trees, but the prairies greatly prevail, especially near the Coteau des Prairies. This huge swell of elevated ground, which has been already noticed, is said to be followed on the west by a broad valley of prairie land, traversed by the James river, and this valley is stated to be divided from the valley of the Missouri by another elevated tract similar to the Coteau des Prairies. These two ridges of elevated ground terminate on the south between 42° and 43° N. lat. The remainder of the country between the Mississippi and Missouri contains no hills of any considerable magnitude. The whole has a waving surface, diversified with broad river-valleys and creeks, and intervening tracts of undulating upland united to the valleys by gentle slopes Belts of forest situated upon the margins of the watercourses divide the whole into extensive parterres. If the tracts contiguous to the Mississippi and Missouri are excepted, at least nineteen-twentieths of the country are entirely without large trees. In some places it is covered with scrubs and furze. The valleys along the rivers expand to a great width compared with the streams which run through them, but they are not bounded by abrupt bluffs, except along the Mississippi and Missouri rivers. These valleys are generally covered with luxuriant grass and other herbage, and occasionally contain forests of moderate extent. The soil of the uplands does not appear to be bad, but the great scarcity of timber and of springs renders them useless for agricultural purposes, except in the vicinity of the river-valleys.

The desert, which occupies the whole basin of the Mississippi west of 96° W. long. to the base of the Rocky Mountains, has an undulating surface, with here and there a hill, knob, or insulated tract of table-land. These eminences become more frequent and more distinctly marked as we approach the Rocky Mountains. The table-lands rise from 600 to 800 feet above the common level, and are often surrounded by rugged slopes and perpendicular precipices, which render their summits almost inaccessible. Their surfaces are usually waving, and in some instances rise into knobs and ridges several feet high; many of them are clothed with a scanty growth of pine, cedar, or scrubby oak, whilst others exhibit a bald or prairie surface. But these table-lands occupy only a small portion of the desert. Hills or knobs occur also frequently, and occasionally swells of greater or less extent. The country is divided into extensive parterres by the valleys of rivers and creeks, which are usually 150 or 200 feet below the common level, and bounded in some places by perpendicular precipices, and in others by bluffs or gentle slopes. Between the Missouri and the Rocky Mountains, and nearly at an equal distance from both, there appears to extend a low range of sandstone hills from south-south-west to north-north-east, which towards the north are called the Black Hills; but we are very imperfectly acquainted with their position and extent; their surface is exceedingly broken and rugged. The surface on the east of this range is not an absolute plain, but is diversified with gentle undulations, such as the draining of water from an immense table-land of arenaceous earth may be supposed to have occasioned. The gradual intermixture of the exuviæ of animals and vegetables with what was formerly a poor silicious sand, has produced a soil capable of supporting a scanty growth of grasses, which are now the only covering of this tract. West of the range called the Black Mountains, the fine sand is exchanged for a gravel made up of rounded granitic fragments, varying in dimensions from the size of six-pound shot to tolerably fine sand. Nearer the mountains pebbles and boulders become frequent, and at length almost cover the surface of the country. In this part larg tracts occur which scarcely exhibit a trace of vegetation, and the whole desert is almost entirely destitute of timber-trees, with the exception of some sandy knobs and ridges, which are thickly covered with red cedars of a dwarfish growth. In the neighbourhood of the Arkansas river the surface of the country is in many places covered with numerous fragments of volcanic rocks. There are some tracts where stones of this description are so numerous as almost to prevent all vegetation from springing up. Various ridges and knobs containing rocks of this character also occur in this district. There are no swamps in the desert. Its surface rises gradually towards the Rocky Mountains, at the base of which the desert is probably between 3000 and 4000 feet above the sea-level.

Rivers draining the Basin of the Mississippi.—The rivers which fall into the Mississippi from the east drain a country

which is cultivable to a great extent. The most northern on this side is the St. Croix river, which joins the Mississippi between the mouth of the St. Peter's river and Lake Pepin. It rises in Upper St. Croix lake, near the head-waters of Bois-Brulé river, which falls into Lake Superior, and there is a portage of two miles between the streams. It flows in a general southern direction, receives numerous tributaries, and about forty miles from its source enters the Lower Lake St. Croix, which is thirty miles long, but of inconsiderable breadth. The river is navigable for about twenty miles above the lake, where it is obstructed by a rapid, but above the rapid it is sufficiently deep for loaded canoes. Its course exceeds 120 miles.

The Wisconsin or Ouisconsin river rises in the centre of the mountain-region called the Wisconsin Hills, through which its course is in a general south direction for about 180 miles. Where it approaches the sources of the Fox river of Green Bay, it turns gradually to the east, and its course in this direction also is estimated at 180 miles. When swollen it is navigable in the lower part of its course for boats of considerable burden, but at the time of low water its navigation is obstructed by shoals and sand-banks. Its valley is rather narrow, its course rapid, and its bed studded with many islands. Its connection with Fox river of Green Bay has been already mentioned.

Rock river rises near 44° N. lat., near the western shores of Lake Michigan, and runs in a south-south-western and western direction about 300 miles, falling into the Mississippi near 41° 30′ N. lat. It is only navigable for small boats. Not far from its head a natural water-communication is said to exist between it and Manawakee river, which falls into Lake Michigan.

The Illinois is formed by two branches, one of which, the Kankakee, drains the country immediately adjacent to the southern extremity of Lake Michigan, and runs westwards; the other, the Plane river, runs at a short distance from the western shores of the same lake. Both rivers are navigable for boats, and have a natural water-communication with Lake Michigan. Between the Plane river and the Chicago river there is a low tract which is inundated during the spring floods. At this season boats frequently pass over it, and there is a project for forming a canal in this tract from the Illinois to Chicago. Kankakee is united by a swampy tract not far from its head to St. Joseph's river, which falls into the eastern side of Lake Michigan. This low ground is covered with water during the spring floods, and then also is passable for boats, but it is not much used. Both rivers unite after a course of about 70 miles, and form the Illinois, whose waters are soon increased by the Fox river, which comes down from the north, and is navigable for a considerable distance. Some miles below its mouth there are rapids in the Illinois which are utterly impassible for boats except in time of flood. At this place the projected canal is to commence. Below the rapids to the mouth of the river, a distance of about 250 miles, the navigation is easy for boats of moderate draught and burden. The current is exceedingly gentle. The river valley is broad, and bounded by parallel bluffs; the bottoms are covered with dense forests, and the upland open prairies have an undulating surface, covered with rich grass and herbage. Among the tributaries in its lower course the most important is the Sangamon, which comes from the east, and is said to be navigable for more than one hundred miles.

The Ohio, the largest and most important of the eastern affluents of the Mississippi, is formed by the confluence of two rivers, the Alleghany and Monongahela. The Alleghany rises in several branches south of the eastern extremity of Lake Erie, and the source of one of these branches is only five miles from the lake. The general direction of its course is first south-west and then south, and after a course of about 200 miles it unites with the Monongahela, the sources of which river are nearly 300 miles south of those of the Alleghany. The Monongahela rises in Virginia, in the Laurel ridge of the Appalachian Mountains, and runs northwards: its course may be about 200 miles. These two rivers, uniting at Pittsburg, form the Ohio, whose course from this place to its junction with the Mississippi, in a direct line, is 548 miles, but measured along its windings 948 miles. At Pittsburg its mean level is 850 feet above the tides of the Atlantic Ocean, and at its junction with the Mississippi about 320 feet. Except in high floods the current of the Ohio is gentle and nearly uniform. About 300 miles from its mouth, near the town of Louisville in Kentucky, are some rapids, where the river falls 22 feet in less than two miles. In times of high water an acceleration of current, not usual in other parts of the river, is all that is perceived in passing down these rapids; but at other times the water is dashed and broken upon the rocky bed of the channel, called the *Indian chute*, through which a great part of the water passes. To avoid these rapids a canal has been made on the south side, called the Louisville and Portland canal. About 15 miles from the mouth of the Ohio a limestone bar extends across the river, called the Grand Chain. This place is impassable for boats of considerable burden in the lowest state of the water. With the exception of these two places, the Ohio has sufficient water during a part of the year to float vessels of 300 tons burden as far as Cincinnati, and boats may ascend it to Pittsburg, and also both of its upper branches for a considerable distance above their confluence. The Ohio runs in a valley, enclosed on both sides by ranges of hills, called River Mountains: these hills vary considerably in height, but are generally between 300 and 500 feet; their ascent is sometimes rocky and abrupt, but often sufficiently gradual to admit cultivation to the summit. The hills diminish in altitude as they approach the rapids of Louisville, where they rise again to a height nearly equal to what they attain at the head of the river; and from thence they gradually lower, until they disappear a little above the confluence of the Ohio and Green rivers. At this point a low country commences, which extends to the mouth of the Ohio, a distance of more than 150 miles: the river also increases in width and diminishes in velocity. The low country on its banks is thickly wooded, and its soil is a deep alluvium. The low hills which bound the alluvial district are at some distance from the stream. As the country is higher along the banks of the river than at the base of these hills, the inundations to which this district is subject leave extensive pools of stagnant water, which during the summer send forth noxious exhalations. The whole vale of the Ohio is well wooded.

The rivers which fall into the Ohio from the north, as the Big Beaver, the Muskingum, Sciota, Miami, and Wabash, are navigable in the greatest part of their course. The Muskingum and the Sciota have lately acquired great importance, owing to the Erie and Ohio canal, which runs chiefly along their courses, beginning on the Ohio at Portsmouth and terminating on the southern shores of Lake Erie at Cleveland. The largest of these affluents is the Wabash, which has a course of above 500 miles, and is navigable for more than 400 miles, though it is obstructed by some rapids about 70 miles from its junction with the White River. As the remotest branches of this river approach the upper course of the Maumee river, which falls into Lake Erie, a canal has been projected and begun, which commences at Tippacanoe on the Wabash, and terminates on the Maumee at no great distance from its mouth: it is now (1839) in progress, under the superintendence of the states of Ohio and Indiana, and will probably be completed in the course of next year; and thus a double water communication will be established between the Ohio and Lake Erie.

The rivers which join the Ohio from the south, especially the Kenhawa, Great Sandy, Kentucky, Green, Cumberland, and Tennessee, are navigable for keel-boats, and many of them for steam-boats, to a great distance from their mouth during the boating season, which generally commences about the 20th of February, and terminates early in June. During the remainder of the year it is only the lower parts of these rivers that are navigable for boats of moderate burden.

South of the mouth of the Ohio no considerable river joins the Mississippi from the east, except the Yazoo, which falls into it five degrees of latitude farther south. Its course may amount to about 250 miles, and it is navigable for boats, in the spring season, for 50 miles from its mouth.

The rivers which join the Mississippi from the west have a much longer course, as most of them rise on the declivity or near the base of the Rocky Mountains; but as they flow for the greater part of their course through a country which, in the opinion of persons well qualified to form a just judgment, can never sustain a numerous population, nor be applied to agricultural purposes, they can never acquire any great importance. The most northern is the St. Peter's river, which, though it has a comparatively short course,

may acquire importance on account of the adjacent country containing many fertile tracts of land. It rises on the northern border of the basin of the Mississippi, in Big Stone lake, which, as already observed, is in the same valley which contains Lake Travers, the source of the Red River of Winnipeg lake, and runs about 300 miles south-east and 200 miles north-east, though its whole course in a straight line does not exceed 275 miles. Its course is exceedingly winding, changing from side to side in its valley, and it is interrupted by several rocky ledges. During the vernal floods it is navigable for boats to Big Stone lake, there being but two obstructions that are impassable on such occasions, namely, at Patterson's Fall, nearly 300, and at Great Portage, about 400 miles from its mouth. At both these places there are portages of moderate length; but during low-water time the upper part of the river is obstructed by shoals and rapids. The vale in which it flows is in the lower parts a mile and a half wide, and enclosed by bluffs about 100 feet high. Along the upper course it is wider, expanding in some places to two or three miles, and the bluffs are lower. The vale presents a mixture of woodlands and prairies; the former however are less frequent along the upper course, and at last disappear, with the exception of some belts which fringe the water. Some parts on the lower course are swampy.

The largest of the affluents of the Mississippi is the Missouri; and as the sources of the Ohio drain the most north-eastern corner of the basin of the Mississippi, so those of the Missouri drain its most north-western angle. It rises in two branches, in which all the waters descending from the eastern declivity of the Rocky Mountains between 42° and 49° N. lat. unite. The northern, called the Missouri, rises near 44° N lat., and runs northwards to north of 47°, partly within the range of the Rocky Mountains, and partly along its base, a distance of more than 300 miles; it then turns to the east, and, after a course of 400 miles, meets the other branch, the Yellow Stone river, which rises between 43° and 44° N. lat.; but its southern affluents rise as far south as 42° N. lat. Its course is first north-north-east and then east, approaching gradually to the Missouri, which it joins after a course of 800 miles. Though the course of these two branches, according to a rough estimate, amounts to 700 and 800 miles, it is very probable that they run upwards of 100 miles more: so that at their junction each of them may be compared with the Rhine in length, and probably also in volume of water, as the Yellow Stone river is 860 yards wide near the junction. But though the numerous affluents which the Missouri receives in its upper course bring down a large body of water from the Rocky Mountains (portions of which are covered with snow, if not all the year round, at least for the greatest part of it), the Missouri loses much of this water during its long course through a sandy desert; and though it is joined in the lower part of its course by some large rivers, it is stated, and very probably, that the volume of water which it pours into the Mississippi is not greater than what it contains immediately after its junction with the Yellow Stone. After the junction of its upper branches the Missouri continues its eastern course for 200 miles, declining however a little to the south, until it reaches the Mandan villages (near 100° W. long.), where it is deflected by the Coteau des Prairies to a southern course for above 300 miles, until it unites with White River. In this course of 500 miles it is joined by several affluents from the west; and though some of them flow from 200 to 300 miles, none of them increases the volume of its water to any amount, as their course lies through the sandy desert. From its junction with the White River it again flows eastward for 200 miles, and then to the east-south-east for 300 miles, to the mouth of the Kansas river, which is its largest tributary, with the exception of the Platte river, which joins it about 180 miles farther up. After the junction with the Kansas river it runs still 250 miles, turning a little to the south of east, and joins the Mississippi near Belle Fontaine, after a course which, according to a rough estimate, exceeds 2150 miles, but which probably is not less than 3000 miles. The Missouri is a very rapid river in the whole of its course, but it contains no falls except in the vicinity of the Rocky Mountains, where it flows over several ledges of rocks for above 18 miles. In the lower part of the course its vale is wide and very fertile, and it is generally covered with a deep and heavy growth of timber and underwood for about 350 miles from its mouth. There are however prairies of considerable extent, even in this part of its course. Higher up the prairies within its vale become more numerous and extensive, till at length all woodlands disappear, except the small tracts at the points formed by the windings of the river.

With respect to the tributaries of the Missouri, it is observed that their mouths are generally blocked up with mud, a fact which seems properly attributed to the floods of these rivers taking place earlier in the season than those of the principal river, whose course is much farther north. The flood of the tributaries carries off the mud which is deposited at their mouth; but on the rising of the principal river, which is caused by the melting of the snow, its floods back up the waters of the tributaries, which are loaded with mud, to considerable distances up these rivers, and in this stagnant state of the waters the mud at their mouth is deposited. It is only in spring-time and before the time of flood in the principal river that these tributaries have any considerable depth of water at their mouths.

We shall notice only two of the affluents of the Missouri, the Platte and Kansas rivers. The Platte or Nebraska rises in the Rocky Mountains with two branches of nearly equal size, called the South and North Fork, which unite after an easterly course of more than 300 miles. After their junction the river flows nearly 500 miles in the same direction. It derives its name from the circumstance of its being broad and shallow: its average breadth is about 1200 yards, exclusive of the numerous islands which it contains: and its depth, in the average state of the water, is so inconsiderable, that the river is generally fordable. The vale in which the river flows, from its mouth to the junction of its forks, is 10 or 12 miles wide, and forms a most beautiful expanse of level and often fertile country. It is bounded on both sides by lands which are from 25 to 30 feet above the vale, and connected with it by gentle slopes. The vale of the Platte river however contains no wood even in its lower course, except on its numerous islands, some of which are of considerable extent, and are all covered with cotton-wood and willows. The islands decrease in number and size as we ascend the stream, till at length they disappear entirely. Along its northern and southern forks scarcely a tree or even a shrub is seen. This river is seldom navigable except for boats made of hides (bull-boats, as they are sometimes called), and for these only when a freshet prevails.

The Kansas river rises in the desert between the southern fork of the Platte river and the Arkansas, with two great branches, the Republican and Smoky Hill forks. These branches unite after an easterly course of nearly 500 miles, about 100 miles from the mouth of the river. This river is navigable for boats of some size, but only during high freshets, and then only for about 150 or 200 miles, the navigation being obstructed by shoals. The vale in which it runs resembles that of the Platte: woodlands occur only in narrow belts along the watercourses. Much of the country upon the forks is said to have a good soil, but is uninhabitable for want of timber and water. The bottoms have a light sandy soil.

Below the mouth of the Missouri the Mississippi is joined by no considerable river from the west for about 400 miles, until south of 35° N. lat. it receives the St. Francis river. This river rises in the hilly country adjacent to the banks of the Mississippi, west of Cape Girardeau; but after about 40 miles it enters the bottom of that river, of which the Great Swamp constitutes a great portion, which is traversed by the St. Francis in all its length. Flowing through a very level country for about 200 miles, its course is very gentle; but the navigation is entirely obstructed by rafts and fallen trees.

The White River follows next. It rises in the Ozark Mountains, towards the western border of that mountain-region, and runs first northward under the name of the Buffalo Fork; afterwards it turns to the east and south east, traversing the mountains and hills in that direction. Where it issues from that region it is joined by the Big Black River, which rises on the northern border of the mountain-region; and in skirting its eastern border, is joined by numerous rivers, which rise to the west, and bring down a considerable volume of water. From the junction with the Big Black the White River runs south, and joins the Mississippi a few miles above the mouth of the Arkansas. The course of the White River exceeds 400 miles, and it is navigable in a moderate state of water for more than 300 miles. The Black River and several of its branches, as the

Strawberry, Currant, Eleven-Point, and Spring rivers, are also navigable to a considerable extent. The rich bottoms on this river are, with the exception of that on White River, subject to sudden and excessive floods, and consequently less adapted to agriculture than to the rearing of cattle.

The Arkansas joins the Mississippi a little farther south: the vale traversed by it, and its great tributary, the Canadian river, are noticed under ARKANSAS RIVER.

The last considerable river which falls into the Mississippi from the west is the Red River. Its most remote feeders rise in the Sierra del Sagramento, or that portion of the Rocky Mountains which separates the elevated valley of New Mexico from the extensive plain east of it. This plain is traversed by its eastern course for nearly 500 miles, after which it traverses the mountain-region of the Ozarks, south of Mount Masserne, for about 200 miles, still running in the same direction. The remainder of its course, which is about 300 miles, is south-south-east. Measured along its winding course, the length of the river is probably not less than 1500 miles. About 300 miles from its mouth is a low swampy district 40 or 50 miles wide, filled with numerous lakes, and inundated for several months in the year. This tract is called the rafts of Red River. Up to this point the river is navigable during the greatest part of the year for large boats, with the exception of one place, near the town of Alexandria in Louisiana, where two ledges of rocks extend across the channel about three-quarters of a mile from each other, and occasion rapids, which however, in high-water, form no obstruction to the passing of boats. At the raft the navigation is intricate and troublesome. That part of the river which is above the raft is rendered impassable for large boats by shoals and sandbars; but keel-boats of ten or fifteen tons may ascend it for some hundred miles above the raft. The upper portion of its vale seems to contain a greater portion of woodland than the other rivers which drain the desert; but its bottom is not extensive, and the bluffs along the southern banks sometimes rise to the height of 500 feet. The lower part of its vale is described under LOUISIANA. The most considerable of its affluents is the Washita, or Ouashita, which is formed by the numerous streams which descend from the southern and northern declivity of Mount Masserne: it runs in a south-eastern and southern direction, receiving numerous tributaries, especially from the wide bottom of the Mississippi. After its junction with the Tensas it takes the name of Black River, and unites with the Red River about 20 miles from its mouth, after a course of about 400 miles. That part of its course which is denominated Black River can always be navigated by boats of considerable burden, and smaller boats may ascend it for 300 miles nearly all the year round. The upper part of its course lies through a hilly country covered with pine-forests, except the bottoms of the river-courses, which sustain a heavy growth of other trees, and are fertile, but subject to inundation, like all the rivers which originate in the Ozarks. The lower part of its course and that of some of its tributaries are in the wide bottom of the Mississippi, and partake of the fertility, marshes, and swamps which characterise the lowlands of the principal stream.

Inundations of the Mississippi.—With respect to the volume of water brought down by the river at different seasons, it is to be observed that this river flows from north to south, from the colder to the warmer regions. As the whole of its basin is situated without the limits of the tropical rains, it is partly fed by autumnal rains, but mostly by the melting of the snow, which falls within the whole of this extensive region, with the exception of the delta. Though the quantity of snow does not appear to be great if compared with that which annually falls on the great plain surrounding Hudson Bay, or on the northern countries of Europe, the great extent of the basin supplies a large body of water at the time of the melting of the snow. The whole however is not supplied simultaneously, but successively: the southern rivers send it down early in the year, while the northern continue to furnish their supply up to midsummer. The Mississippi is at its lowest level in autumn and winter, from October to January. It begins to swell in February, when the freshets come down the Red River, which last for two or three months; but in March and April they are increased by the floods of the Arkansas, and nearly at the same time by those of the Ohio. Before they subside, in May, the great floods of the Missouri and Upper Mississippi commence, and continue to maintain the high level of the water to the middle of July, or even to the end of that month. From the middle of August to October the river is low. In the month of October its level is somewhat increased by the autumnal freshet of the Ohio, but it soon subsides again.

The inundations extend only over the wide bottoms adjacent to the banks of the Mississippi, and differ in all of them, both as to time and duration. The American Bottom and the somewhat elevated country between the mouth of St. Francis river and 33° N. lat. are inundated only for a few weeks in April and May, and the water rises only a few feet. These tracts are accordingly cultivable. But a large proportion of the other bottoms is inundated for several weeks, and the low country of the delta even for six months, and exactly at the season which alone is favourable to cultivation, from March to August. These extensive tracts are therefore swampy. The water rises on them from 8 to 15 feet, and in some parts of the delta even to 30 feet.

Depth and Navigability of the Mississippi, Missouri, and Ohio.—Though only two of the six mouths of the Mississippi have as much as 12 feet of water (the other four varying between six and eight feet) [LOUISIANA], the river deepens considerably a short distance above the mouths, and continues to increase in depth to the town of New Orleans, where it is stated to be 130 feet deep at low water As far as the town of Natchez in Mississippi, few obstructions to navigation occur, the river being so deep, that sunken trees and sandbars are too far below its level to cause any danger to the vessels. From Natches upward to the confluence of the Missouri, the impediments become more numerous and difficult. Still the main channel, though intricate in many places, has always a sufficient depth of water for boats of five or six feet draft to ascend to the mouth of the Ohio. Between the mouth of the Ohio and that of the Missouri, during the low state of the water, the navigation is obstructed by shoals and the two ledges of rocks called the Big and Little Chain, and only vessels drawing about three feet of water can be used. Between New Orleans and the mouth of the Missouri, the average velocity of the current is supposed to be three miles and three-quarters per hour, in a moderate state of the water; but when the river is high, its velocity is considerably increased. Above the mouth of the Missouri, the Mississippi is generally much less rapid, and does not exceed two miles or two miles and a half per hour; but its navigation is more intricate and difficult on account of the numerous islands and shoals. This upper part of the river is also generally blocked up with ice during the winter season. The navigation of the Missouri is much more difficult and intricate, on account of its numerous sandbars and islands, and more dangerous on account of the frequency of sunken trees and rafts. During the high floods (from March to July) there is a sufficient depth to admit boats of almost any burden; but during the remainder of the year it can hardly be called navigable, except for boats drawing no more than two or three feet. The average velocity of its current, in a middling state of water, may be estimated at four miles and one-third, which, in times of freshets, is accelerated to five or five miles and a half per hour. The river is usually blocked up with ice during the winter.

The Ohio has a much more gentle current. Its average velocity, in a moderate state of the water, may be estimated at two miles and a half, and in a high state, at three miles per hour. The obstructions to its navigation are sandbars, some few sunken trees, and rapids, to which we must add the intricacy of its channel in several places. During a middle and high state of water these obstructions entirely disappear, and an accelerated current is the only difficulty to be encountered. There are large masses of floating ice during part of the winter. The season in which the navigation of this river can be depended upon commences between the middle of February and the first of March, and continues to the latter end of June. An autumnal freshet usually takes place in October or November, and the river is again navigable for a few weeks. During the remainder of the year only boats from 50 to 75 tons burden can be used, and they meet with numerous obstructions in their progress from the lowness of the water.

Navigation and Trade.—The city of New Orleans carries on an active trade with the countries which skirt the lower course of the Mississippi, and particularly with those on both sides of its great tributary, the Ohio, and its numerous

affluents, and the trade is rapidly increasing. As the goods are exclusively conveyed by water, the number of steam-boats and of flat-bottomed and keel boats which navigate the Lower Mississippi and Ohio is very considerable. According to an estimate, the number of steam-boats employed in this trade at the beginning of 1834 amounted to 230, measuring more than 39,000 tons, namely:—

	Tons.
25, each above 200 tons, passing between Louisville and Cincinnati, on the Ohio, and New Orleans, measuring	8,484
4 between Florence, on the Tennessee, and New Orleans	1,617
7 between Nashville, on the Cumberland river, and New Orleans	2,585
4 between St. Louis, on the Mississippi, and New Orleans	1,002
7 between the places on the banks of the Mississippi where cotton is grown, for the transport of that commodity . . .	2,116
57, from 120 to 200 tons, in other branches of trade on the Lower Mississippi . .	8,641
The remainder, about 126, were of small size, under 120 tons, and employed in various trades	14,653
	39,098

The number of flat-bottomed and keel boats employed in this trade has been estimated at four thousand, with a tonnage amounting to 160,000, so that the whole tonnage employed in this trade is about 200,000.

The Missouri is only navigated by the fur-traders from Mackinaw. The difficulties of the navigation, added to the hostile character of several of the tribes which frequent its banks, render the progress of the common boats very slow, and expose the crews to great dangers in those places where they are obliged to sail near elevated and wooded banks, and are exposed to the sudden attacks of the Indians. At present the American Fur Company established at Mackinaw sends steam-boats up the river as far as the Mandan villages, to collect the furs which the Indians bring down the tributaries of the Missouri in bull-boats.

(Lewis and Clarke's *Travels to the Source of the Missouri*; Pike's *Exploratory Travels through the Western Territories of North America*; James's *Account of Major Long's Expedition from Pittsburg to the Rocky Mountains*; Keating's *Narrative of Major Long's Expedition to the Sources of St. Peter's River*; Darby's *View of the United States*; Schoolcraft's *Narrative of an Expedition through the Upper Mississippi to Itasca Lake*; Irving's *Astoria*.)

MISSISSIPPI, THE STATE OF, one of the states constituting the North American Federation, is situated between 30° and 35° N. lat., and between 88° and 91° 40′ W. long. Its length from north to south is 333 miles, and its average breadth about 150 miles. The surface is estimated at 51,000 square miles, an area somewhat larger than that of England without Wales; but according to some authorities, the area is only about 48,000 square miles. The river Mississippi forms its western boundary from 35° to 31° N. lat., by a course of about 530 miles, dividing it from Arkansas and Louisiana. The parallel of 31° N. lat. separates this state from Louisiana, between the Mississippi and Pearl rivers, for about 105 miles; and the remainder of the boundary-line between these two states is formed by the Pearl river, from 31° N. lat. to its mouth, a distance of more than 60 miles. The Gulf of Mexico washes the southern extremity of the state for about 80 miles. On the east it borders on Alabama, which is separated from it by a line extending nearly 340 miles, and running between 88° and 88° 40′ W. long. On the north the parallel of 35° N. lat. divides Mississippi from Tennessee.

Surface and Soil.—The shores near the mouths of the Pascagoula and Pearl rivers are low and sandy, and in many places interrupted by swamps; these tracts are therefore unhealthy. In the space between the two rivers there is a higher tract of land, beginning two miles east from St. Louis Bay, and stretching to Biloxi Bay, a distance of nearly 24 miles. This tract is healthy, and is resorted to by the inhabitants of Lower Louisiana during the sickly season. The country which stretches northward from this coast to 31° N. lat. is low, and the soil is uniformly sandy and covered with extensive pine-forests, which on the Pearl river contain many large trees adapted for the construction of vessels. The country between 31° and 32° N. lat. includes by far the best portion of the state. The tract contiguous to the Mississippi river consists of numerous hills, very irregularly scattered over the surface, and rising from 50 to 150 feet above the narrow low tract which in some places lines the course of the river. The hills, the base of which is washed by the Mississippi, are called Bluffs, and this region is generally called by that name. It extends from 10 to 25 miles inland, and is of great fertility, being covered with forests of oak, sweet gum, poplar, tulip-tree, ash, maple, and hickory, with a few pine trees. This tract appears to be the western continuation of the country farther east, which rises imperceptibly higher, and extends in wide plains. The numerous watercourses which rise on these plains have furrowed their outer edges, along the Mississippi, and imparted to them a hilly aspect, together with a great degree of fertility. The surface of the plains themselves generally consists of an unproductive sand, and is covered with the long-leafed pine; but the continuity of the level ground is interrupted by the bottoms, which extend along the numerous affluents of the Mississippi, Pearl, and Pascagoula rivers, are several feet lower than the surface of the plains, and from half a mile to three miles wide. These bottoms have a rich and productive soil, covered with a fine growth of trees, such as gum, laurel, oak, and cotton-tree, intermixed in the more elevated parts with lofty canes, and in the lower with cypress. The Bluff region continues northward to the mouth of the Yazoo river. The plains, which are covered with pine-forests and furrowed by streams, extend somewhat farther north, where they begin to be intersected with prairies, which increase in number and extent as we proceed farther north, and seem to occupy the greatest portion of the country lying north of 33° N. lat. The fertility of these prairies is doubtful, but they are covered with grass during the greatest part of the year, though the country is dry, and suffers from want of water. East of this prairie region extends a fertile tract on the upper course of the Tombigbee, which resembles the bottoms in fertility, but is more extensive. In the northern districts is a range of hills of moderate elevation, terminating on the Mississippi river with what is called the Fourth Chickasaw Bluff, which extends 10 miles along the river, is from 60 to 100 feet above its bank, and is stated to be fertile to a considerable distance from the river. Between these hills and the Walnut Hills, with which the southern Bluffs terminate in about 32° 20′ N. lat., a distance of more than 170 miles, the country is occupied by an immense swamp, produced and fed by the inundations of the Mississippi. A few miles south of the Fourth Chickasaw Bluff the river sends off a branch on the eastern side, which traverses the low region, and covers it with water early in the year. Some parts of this low region become dry towards the end of the year, but the others are a perpetual swamp. This tract extends to the banks of the Yazoo river, and is in the widest part (near 34° N. lat.) above 50 miles wide. Like the swamps on the banks of the Atchafalaya, it is covered with timber-trees, especially cypress.

Rivers.—Several of the smaller affluents of the Mississippi rise and terminate in this state. The most important are the Homochitto, the Big Black, and the Yazoo rivers. The Homochitto runs about 70 miles, and is navigable to some distance from its mouth for small craft. The Big Black River flows about 160 miles, mostly in a south-western direction, and is navigable about 70 miles from its mouth in the rainy season. The Yazoo river rises in three branches in the range of hills which traverses the northern part of the state, and flows mostly with a south-south-western course for more than 220 miles. Not far from its mouth it unites with False River, that branch of the Mississippi which leaves the great river south of the Fourth Chickasaw Bluff, and traverses the swampy region. In spring large vessels can ascend the Yazoo for 50 miles from its mouth, to the junction of its two great branches, which are navigable for small boats some distance farther up. The Pearl river rises in the centre of the state, and runs first south-west, and afterwards south-south-east, for about 250 miles. It falls by several branches into the Rigolets, or straits which unite Lake Pontchartrain with Lake Borgne. It is stated to be navigable for boats for 150 miles, but its entrance is shallow, and does not admit vessels which draw more than five feet. The upper branch of the Pascagoula rises, under the name of Chickasawhay, in the prairie

region, between 32° and 33° N. lat., and flows south for about 120 miles, when its waters are increased by those of the Leaf river, a large affluent running down from the north-west. Below this junction the river assumes the name of Pascagoula, and continues to flow southwards for 50 miles, when it falls into the bay of the same name, opposite Cuerno or Horn Island. Near its outlet it is joined by a considerable tributary, the Dog river, which runs parallel to it. The Pascagoula is stated to be navigable for small boats to a distance of 120 miles from its mouth, but the æstuary into which it falls is too shallow to admit vessels drawing more than four feet water. In the north-eastern districts are a part of the Tombigbee [ALABAMA] and the Tennessee rivers.

Climate.—As this state rises from a low shore to 500 feet and upwards in its central and northern districts, a great difference of climate prevails in the different regions, especially as the northern districts are nearly five degrees from the southern. Little however is accurately known respecting the more elevated parts. Along the southern coast the winters are mild, frost being of rare occurrence. The heat of the summer is less oppressive than in many states farther north, a circumstance which may be ascribed to the prevalence of the sea breeze from the Gulf of Mexico during this season. The Bluff region along the Mississippi river differs considerably in climate. The summer is in general very hot and the heat oppressive, whilst the winters are colder than might be expected. Every year the thermometer sinks to about 25°, and occasionally so low as 18°. In 1807 the creeks in the neighbourhood of Natchez were frozen, and in many instances covered with ice more than an inch thick.

Productions.—The principal objects of cultivation are cotton and Indian corn, and a little sugar. Wheat, rye, and oats do not thrive so well as in the northern states, and are only cultivated for home consumption. Indigo and tobacco were formerly grown to some extent in the neighbourhood of Natchez, but they have lately been superseded by cotton. Plums, peaches, and figs are abundant; but oranges do not ripen even in the southern districts. Most of the vegetables of Europe thrive well, but their cultivation is not much attended to. Cattle are very numerous, though of a small size. The horses are of a small breed. Sheep are also not numerous; and it is stated that their wool is coarse. Wild animals, such as pumas, wolves, bears, and wild cats, still abound. Alligators occur in the Mississippi as far north as the mouth of the Arkansas river, and in some of the smaller rivers. Parroquets are seen as far north as Natchez; wild turkeys and pigeons abound. There is said to be coal in the north-eastern districts near the Tombigbee and Tennessee rivers.

Inhabitants.—More than half of the territory of this state was, a few years ago, in possession of two aboriginal tribes, the Chocktaws and Chickasaws. The last-mentioned nation occupied the country between 35° and 34° N. lat., and also a tract south of 34°; and the Chocktaws, the country between 34° and 33° along the Mississippi, but along the eastern boundary-line of the state they spread to some distance south of 32°. The number of individuals composing both tribes within this state was then estimated at 23,000 or 24,000, and no state in the Union had a greater number of aborigines within its limits. Though many of them adhered to their mode of life, others had made settlements, and cultivated some patches of ground, but they attended more especially to the rearing of cattle and swine. By an agreement with the State government in 1832, the Indians consented to evacuate the country gradually, and to settle in the territories west of the Mississippi river. We do not know if this has already taken place to the full extent. The Natchez and Yazoos, who lived formerly along the banks of the Mississippi, are wholly extinct.

The other inhabitants are whites, principally from other states of the Union, and negro slaves. Their number amounted in 1820 to 75,448, and in 1830 to 136,623, of which number 95,659 were slaves. The best peopled section of the state is the south-west angle, where the most extensive body of productive soil exists; all the other districts are very thinly inhabited, but the population is rapidly increasing along the upper course of the Tombigbee river.

Political Division and Towns.—That portion of the state in which the whites have formed settlements is divided into 42 counties, including those lately laid off in the Indian country. The seat of government is at Jackson, an inconsiderable place, on the banks of the Pearl river. The most important town of the state is Natchez, built on a series of small hills, about half a mile from the bank of the Mississippi, and, according to some accounts, about 100 feet above its bed, but it is not visible from the river owing to the intervention of a steep bluff. Though its population in 1820 amounted only to 2184, and in 1830 to 3540, it carries on an extensive trade, exporting annually from thirty to forty thousand bales of cotton. Among the other towns, Monticello on the Pearl river, Vicksburg near the Walnut Hills, and Shieldsborough on St. Louis Bay, are the principal; and even these are very inconsiderable places. St. Louis Bay is nearly 10 miles long and four wide, but it is too shallow to admit even small vessels. Jefferson college, at Washington near Natchez, is well endowed: there also ample funds for popular instruction, but hitherto little has been done with them.

Manufactures and Commerce.—The manufactures do not extend beyond the most common mechanical arts. Though this state has a coast-line of about 80 miles, it has no harbour deep enough for schooners; and the adjacent country does not produce one single article for exportation. The fertile tract along the Mississippi, which produces cotton and Indian corn in abundance, sends these articles down to New Orleans, whence it is supplied with those goods of foreign growth or manufactures which are consumed in the country.

History and Constitution.—The first settlements were formed in the neighbourhood of Natchez by some Frenchmen in the beginning of the last century, but they did not thrive. When the country was ceded to the British in 1763, some respectable settlements were founded in the same parts, but under the sway of the Spaniards (1783 to 1800) they again began to decline. In 1800 all that is now comprised in Mississippi and Alabama was formed into a territory by the name of Mississippi Territory. In 1817 this territory was divided into two portions, and the western was admitted as a member of the Union, and the present constitution was formed. The legislative body consists of a senate and a house of representatives, the members of which are chosen by all free citizens of the state who are twenty-one years of age. The executive power is vested in a governor, elected, with the lieutenant-governor, every two years by all the free citizens. Mississippi sends two members to the senate and one to the house of representatives at Washington.

(Darby's *View of the United States;* Warden's *Account of the United States*; Pitkin's *Statistical View of the Commerce of the United States.*)

MISSISSIPPI COMPANY. [LAW, JOHN.]

MISSOURI, River. [MISSISSIPPI, River.]

MISSOURI, one of the states belonging to the North American Confederation, lies on the west of the Mississippi, between 36° and 40° 36′ N. lat. and 89° 5′ and 94° 30′ W. long. Its mean length from south to north is 280 miles, and its mean width from east to west 225 miles. Its surface is estimated at 63,000 square miles, or nearly 5000 miles more than the area of England, including Wales. The Mississippi flows along its eastern boundary for 550 miles, its numerous windings included, and divides it from the states of Illinois, Kentucky, and Tennessee. The southern boundary-line runs along the parallel of 36°, between the Mississippi and St. Francis, for about forty miles, then along the course of the last-mentioned river northward rather more than eighty miles to 36° 30′, which parallel forms the boundary to 94° 30′ W. long. This meridian forms the western boundary-line, and the parallel of 40° 36′ the northern as far east as the river Moines, which for the last twenty miles of its course separates Missouri from the country in possession of the Fox Indians.

Surface and Soil.—Beginning with the most southern district, we find that an extensive bottom land extends along the Mississippi, which commences on the north opposite the mouth of the Ohio river, and extends southward to that of the Arkansas. It is uninterrupted by hills or high lands, and is subject in many places to being inundated by the Mississippi. It includes many large swamps, which are rendered almost impenetrable by a dense growth of trees, mostly cypress. The most extensive of these swamps, called the Great Swamp, commences near the head of the bottom and passes southwards to the mouth of the river St. Francis, penetrating far into the state of Arkansas. This swamp is

about 150 miles in length, with a width varying from five to twenty or twenty-five miles. The cypress-trees, though of superior quality, are of little value on account of the difficulty of removing them. Within the bottom are numerous lakes, lagunes, and marshes, but it contains also many isolated tracts of considerable extent, which are elevated above the range of the highest floods. The bottom, almost throughout its whole extent, supports a dense and heavy growth of timber of excellent quality, but few settlements have been made in it. Between the mouth of the Ohio river and Cape Girardeau is the Tywapata Bottom, which is about twenty miles long, from three to six in breadth, and covered with a thick growth of timber and rushes. As it is well adapted for the growth of grain, cotton, and tobacco, several settlements have been formed on it.

The high grounds along the Mississippi begin twelve miles below Cape Girardeau, and extend to the mouth of the Missouri river. The highest part lies between St. Genevieve and the mouth of the river Maramec, where the banks of the Mississippi, composed of solid masses of limestone, rise in some places 360 feet above the water. This undulating country extends westward to the river Gasconade, occupying the basin of the Merrimack or Maramec river as far south as the lead-mining district. It is diversified with prairies and forests, the lower lands being well wooded, but the high grounds very thinly; scarcely a shrub is seen on the natural meadows. This is the most populous section of the state.

Between the rivers Gasconade and Osage, both of which are affluents of the Missouri river, a range of low hills approaches the Missouri, rising from 150 to 200 feet above the level of its water. They are thinly wooded, and constitute the most northern offset of the Ozark mountains, a region of which the undulating country between Cape Girardeau and the river Gasconade may be considered as the most northern and lowest portion. The range extends from this point in a south-western direction to the southern extremity of the state of Arkansas, where it terminates on the banks of the Red River. The length of this mountain tract may be 450 miles, and its average breadth about 150 miles. It covers more than one-half of the surface of that portion of Missouri which is south of the Missouri river, bordering on the east on the wide bottom of the Mississippi, and on the west on the undulating country through which the Osage river flows. The surface of this tract is extremely hilly, broken, and mountainous; the hills and mountains rise from 500 to 1000 feet above their base, though not so high as in Arkansas, where they attain the height of 1500 feet and more. The hills are exceedingly numerous, but do not form continuous ranges, being divided into a multiplicity of knobs and peaks with rounded summits, and presenting perpendicular cliffs and abrupt precipices of sandstone. They are covered with a poor soil, which is generally shallow, and overgrown almost exclusively with pitch-pine, cedar, and bramble. Along the numerous rivers which originate in this mountain tract are bottoms of moderate extent, which, with some valley land, are the only parts of it which have a rich soil, and would repay cultivation. Few settlements however have been formed on them, because they are subject to excessive floods occasionally brought down by the rivers from the hills and mountains. These floods come so suddenly, that on some occasions the water has risen, in the course of one night, more than twenty feet. The country west of this mountain-region, especially the basin of the Osage river, resembles that which is east of the river Gasconade, its surface being undulating and diversified with woodlands and prairies. But the prairies cover a much greater portion of the country, and the forests, in addition to being of only moderate extent, produce nothing but stunted timber. The dry prairies occupy at least nineteen-twentieths of the surface. This region however does not extend to the banks of the Missouri, being separated from it by a rich alluvial soil, which extends along the river from the mouth of the Osage river to that of the Mine river, with a width of four or five miles, and is usually denominated the Boon's Lick country. This bottom contains a considerable number of settlements, and it is probably the most fertile portion of the state. Opposite to it extends a similar bottom land along the northern banks of the Missouri from Côte sans Dessein to Chariton river. These two tracts are better settled than any other part of Missouri, with the exception of the country near the confluence of the Missouri and Mississippi; but the greater part is still in a natural state, and covered with a deep and heavy growth of timber.

In the country north of the Missouri, which comprehends about one-third of the state, the fertile tracts are nearly exclusively confined to the bottoms along the Missouri and Mississippi. Those of the last-mentioned river, though equally extensive, are not so fertile as those of the Missouri, which appears from their containing less forest in proportion to their area, the prairie land being of greater extent and occurring more frequently. The surface of the country between these two large rivers is in general undulating, though it is not entirely destitute of abrupt hills and precipices. The whole is diversified by the broad valleys of rivers and creeks, and intervening tracts of undulating upland, which are united with the valleys by gentle slopes. The woodlands occur only upon the margins of the water-courses, and the uplands are extensive prairies completely destitute of a timber-growth. These prairies occupy at least nineteen-twentieths of the whole region, and comprehend some of the best land in the state, which however cannot be cultivated at present, as they supply neither wood nor stone for making fences.

Rivers.—The Mississippi washes the eastern boundary for 550 miles, and the Missouri traverses the state from west to east, with a winding course of about 400 miles. [MISSISSIPPI.] Some of their affluents require notice. White River and Francis river are described in ARKANSAS TERRITORY. Maramec river, which enters the Mississippi about 40 miles below the mouth of the Missouri, is only a small river, its course not exceeding 100 miles; but it is important as flowing from the lead district and affording navigable channels to a fertile and improving tract of country. Salt River, which joins the Mississippi about 60 miles above the mouth of the Missouri, runs more than 200 miles with rather a gentle course, and through a tolerably fertile bottom, on which the number of settlements is increasing. Of the rivers which join the Missouri, the Gasconade and Osage are the principal. The Gasconade is rather small, and runs about 120 miles; but derives some importance from its position, though the number of settlements on its banks is small. The Osage river rises in the plains between the Arkansas and Kansas rivers, and flows in a general direction east-north-east about 300 miles, joining the Missouri very near near the centre of the state. On its northern bank is a tolerably wide bottom with an alluvial soil of considerable fertility, where several settlements have been made. It is navigable through the greatest part of its course.

Climate.—The climate of Missouri is cold and extremely variable. The winters are severe and long. Three years out of five the Mississippi can be crossed on the ice at St. Louis, and sometimes it is frozen for two months and more. The summers are often hot, but subject to sudden and frequent changes of temperature. This circumstance is mainly to be attributed to the north-western winds, whose chilling blast is experienced over all the countries west of the Alleghany mountains, and even east of them, but in this state they are felt in all their force. Though they are dry and bracing, they produce sudden and unpleasant changes in the temperature of the atmosphere. The mean annual temperature of St. Louis is estimated at 56°, or about 6° more than that of London, but it has probably been overrated.

Productions.—Wheat and Indian corn are the staples of this state; but in the south-east section cotton is produced. Agriculture is still in its infancy, as may be expected in a country which has been so lately settled. It seems that most of the vegetables and fruits of England would grow if they were attended to. Tobacco, hemp, and flax are cultivated on the bottoms along the Mississippi. Cattle abound where the bottoms and prairies are near one another. In summer they feed on the grass of the prairies, and in winter on the cane and rushes of the alluvial soil. Horses and hogs are numerous. Buffaloes are met with in large herds on the prairies east and west of the Ozark mountains, and also elk and deer. The animals, which are killed for their skins only, are beavers, otters, bears, foxes, cats, racoons, martens, and lynxes. The fur trade however has somewhat decreased of late years.

The mineral wealth chiefly consists of lead, coal, iron, and salt. The principal lead region is in Washington county, on both sides of Big River, an affluent of the Maramec river, and extends about 100 miles in length by 40 in width; but this mineral occurs in detached masses in other places

also, between White River and the Missouri. In some years these mines have produced more than one million of pounds. Coal exists in several places, but it is not worked, though it must soon become of importance in a country which is so cold and so generally destitute of wood. Iron-ore in abundance occurs in the hills.

Inhabitants.—There are still some aboriginal tribes within this state. The Delawares and Shawanese, or Shawnees, with some Creeks, Chocktaws, and Chickasaws, have emigrated from the countries east of the Mississippi, and retired into the country extending between the White and St. Francis rivers, where they live in large and commodiously built houses. They cultivate maize and vegetables, and rear horses and cattle, but have not abandoned hunting. Along the western border of the state are the Osages, who have their permanent dwellings in villages beyond the boundary-line, near the head-waters of the Osage river; but their hunting-grounds extend within the territories of Missouri. They also cultivate maize, pumpkins, beans, water-melons, and squashes. The number of individuals composing these tribes is stated to exceed five thousand. The remaining population consists of whites and blacks. In 1820 their number amounted to 66,586, of which 55,988 were whites, 376 free persons of colour, and 10,222 slaves. In 1830 the number had increased to 140,190, of which 115,200 were free people and 24,990 slaves.

Political Division and Towns.—Missouri is divided into 34 counties; but some extensive tracts, especially in the south-western and north-western sections, are not yet laid out in counties. The seat of the government is Jefferson, an inconsiderable place, situated on the Missouri, about twenty miles above the mouth of the Osage river. The most considerable place is St. Louis, which stands on the gently sloping banks of the Mississippi, about twenty miles below the mouth of the Missouri. The buildings spread from the margin of the river to the brow of the bank, beyond which the country extends in a level and mostly open prairie. In 1816 the population amounted only to 2000, but it is now much increased. The whole commerce of the country is concentrated in this place, which is a depôt for all European and foreign goods destined for the consumption of the countries bordering on the Upper Mississippi, Missouri, and Illinois rivers. The channels by which St. Louis is supplied with them are the Lower Mississippi and the Ohio river. Four steam-boats were employed in its trade in 1834, measuring more than 1000 tons. St. Genevieve, with 2000 inhabitants, on the Mississippi, is the principal depôt of the produce of the mines, which is brought down by the Maramec river. In the mining district is Potosi, a small but thriving place. New Madrid, a small place, in the vicinity of which cotton is grown, stands also on the Mississippi: it was visited by a dreadful earthquake in 1811. St. Charles, on the Missouri, about 20 miles from its mouth, has 1200 inhabitants, and some commerce with the country about the town. Franklin, on the Missouri, below the mouth of the Mine river, has 1500 inhabitants, and is the starting place for the caravans which visit Santa Fé, in New Mexico, and go even to Chihuahua.

There is a Roman Catholic college at St. Louis, conducted by the Jesuits, and another Roman Catholic seminary at Bois-Brulé Bottom. The principal sects are Roman Catholics, Methodists, Baptists, and Presbyterians.

Manufactures and Commerce.—Most manufactured articles are imported from the states east of the Mississippi. Commerce is limited to the export of Indian corn and live stock, with cotton in a moderate quantity, and lead. Besides its own live stock, many horses and mules which are imported from Mexico are sent to the states farther east. Furs still form a considerable article. The imports chiefly consist of manufactured goods, with some colonial goods and wine.

History and Constitution.—Although this country for more than a century had been visited by the French from Canada, no settlement was formed before 1763. In this year St. Genevieve was founded, and in 1764 St. Louis. But these and a few other places remained in a backward state up to 1803, when the United States got possession of the country, which was then comprehended in Louisiana. The following year the state now called Louisiana was separated from it, and Missouri became a separate territory. In 1821 it was admitted as a member of the Union, and formed its constitution. Slavery is allowed in this state. The legislative body is composed of two assemblies, a senate and a house of representatives. The members of both are chosen by all the free citizens who have completed their twenty-first year. The executive power is vested in a governor, elected, with the lieutenant-governor, every four years by all the free citizens. The judges are appointed by the governor, with the advice and consent of the senate: they hold office during good behaviour, but not beyond the age of 65 years. Missouri sends two members to the senate, and one to the house of representatives at Washington.

(Darby's *View of the United States;* Warden's *Account of the United States;* James's *Account of an Expedition to the Rocky Mountains, performed by Major Long;* Pike's *Exploratory Travels through the Western Territory of North America;* Lewis and Clarke's *Travels to the Source of the Missouri;* Pitkin's *Statistical View of the Commerce of the United States of America.*)

MIST. The vapour of water, when mixed with air of the same or a higher temperature, is invisible; but when the temperature of the air is reduced below that of the vapour, the vapour becomes visible, and forms a *mist.* Water, in the state of vapour, is continually rising into the atmosphere at all the usual temperatures. At and even below the freezing-point water evaporates, and ice and snow, in a dry atmosphere, gradually disappear without becoming liquid. But as heat is the sole cause of the conversion of water into vapour, the quantity produced, other things remaining the same, is in proportion to the temperature; so that in very hot weather the air is not easily saturated with vapour, and in cold weather evaporation is slow: thus there is more vapour in the air in summer than in winter, and in hot countries than in temperate climates, in all cases where similar surfaces of water are exposed to the sun's rays. Indeed, it has been found that the quantity of vapour in the air diminishes nearly uniformly with the temperature from the equator to the poles. But as the quantity of vapour which the air will hold at any given temperature is limited, whenever that quantity is near or at the point of saturation, a very small reduction of temperature renders the air misty, and a further reduction converts the vapour into rain.

As every reduction of the temperature of the air has a tendency to destroy the transparency of the vapour which it contains, the atmosphere in our variable climate is seldom very clear. Soon after sunrise however, in fair weather, the vapour near the earth having been precipitated by the night-cold in the form of dew, and the sloping rays of the sun having little power to raise more vapour, the air is almost perfectly transparent, and every object has a clearness and sharpness of outline which it never has at any other time of the day.

When the mist is very thick, it is called a *fog.* The fogs which frequently occur in London in the winter arise from the large quantity of vapour produced by a great city being condensed by cold: and as it is not carried off by winds, it is mixed with the smoke, and forms a thick mass in and about the town; while at a short distance the air is often quite clear, and the limits of the fog may be distinctly observed.

When the vapours in the upper regions of the atmosphere are condensed and become visible, they form clouds. [CLOUD.] When those near the surface of the earth are precipitated upon cold objects, they form *dew* and *hour-frost.* [DEW.]

MISTONUSK, one of the Cree Indian names for the American badger, *Meles Labradoria* (Sab.).

MITAU, MITTAU, or MIETAU, a government of European Russia, is composed of the antient duchy of Courland and Semgallen or Semigallia. It is situated between 56° 20′ and 57° 45′ N. lat., and between 22° 38′ and 25° 18′ E. long. Its area is 10,000 square miles, and the population 600,000. [COURLAND.] MITAU, the capital (in Lettonian, Jelgawa), in 56° 40′ N. lat. and 23° 43′ E. long., lies on the Drixe, a small stream which falls into the Aa a few miles north of the town, and the Jacob's canal, which was completed in 1822, and supplies the town with water. It was founded in 1272 by Conrad von Medun. The town is surrounded with old much-decayed ramparts, and has 16,500 inhabitants, among whom are 2700 Jews. There are nine churches of the several Christian sects, a synagogue, a gymnasium, founded in 1775, which has a museum, an observatory, a library of 24,000 volumes, and a separate free-masons' library of 16,000 volumes; there are

several well-ordered schools and charitable institutions. The town, which lies in a flat marshy spot near the Aa, has not an inviting appearance, though it is not closely built; it contains large gardens within the walls, and has some broad, straight, regularly built streets, only a few of which however are paved. Out of the town is the fine palace (which was never completed), the former residence of the dukes of Courland, but now converted into barracks. The manufactures are linens, leather, and soap. Mitau was for several years (prior to the treaty of Tilsit, 1807) the residence of Louis XVIII., king of France, during his exile.

MITHRADA'TES, or MITHRIDA'TES, a common name among the Medes and Persians, which appears to have been formed from *Mitra*, or *Mithra*, the Persian name for the sun, and the root *da*, signifying 'to give,' which occurs in most of the Indo-Germanic languages. The name however was written in several ways. In Herodotus (i. 110) we find Μιτραδάτης; in Xenophon (*Anab.*, vii. 8, § 25), Μιθριδάτης; in the Septuagint (*Ezra*, i. 8, iv. 7), Μιθραδάτης, which represents the Hebrew מִתְרְדָת; and in Tacitus (*Ann.*, xii., c. 10), *Meherdates*. On the Greeks coins it is written Mithradates.

A large class of names in different dialects of the Indo-Germanic languages have the same termination as Mithridates. Thus in Sanskrit we find the names *Devadatta*, *Haradatta*, *Indradatta*, *Somadatta*, that is, 'given by the gods,' 'by Hara or Siva,' 'by Indra,' 'by Soma, or the moon;' and in Greek, such names as *Theodotus*, *Diodotus*, *Zenodotus*, and *Herodotus*. In Persian names the same termination occurs; as in the *Hormisdates* of Agathias, the *Pharandates* and *Pherendates* of Herodotus (vii. 67, ix. 76), and the *Madates* of Curtius (v. 3).

Mitra, or Mithra, is said by some writers to have been one of the most powerful good spirits created by Ormuz. The mysteries of Mithra were celebrated with much pomp and splendour on the revival of the Persian religion under the Sassanidæ; but we do not read of the worship of the sun under this name in the earlier Greek writers. (Hyde, *Hist. rel. vet. Pers.*, c. 4, p. 109.) The word is evidently the same as *mitra*, one of the names for the sun in Sanskrit. This word also appears in many other antient Persian names, as Μιτροβάτης (Herod., iii. 120), Ἰθαμίτρης (ix. 102), Ἰθαμάτρης (vii. 67), Σιρομίτρης (vii. 68), &c.; and in Μιτραῖος, Μιθρίνης, or Μιθρήνης (Xenoph., *Hell.*, ii. 6; Arrian, *Anab.*, i. 17, iii. 16), which appear to be derivatives. (Pott's *Etymologische Forschungen*, i., p. xlvii., &c.; Rosen, in *Journal of Education*, ix., p. 334, 335.)

The most celebrated race of princes of the name of Mithridates were the kings of Pontus, who were descended from Artabazes, one of the seven Persian chiefs who overthrew the Magi, B.C. 521. (Florus, iii. 5; Diod., xix. 40; Polyb., v. 43.) The following is a list of these kings:—

MITHRIDATES I., of whom little is known. (Aristot., *De Rep.*, v. 10.)

MITHRIDATES II. succeeded Ariobarzanes II., B.C. 363. He took an active part in the various wars which were carried on by the successors of Alexander the Great; and being an active and enterprising prince, he greatly extended his paternal dominions, whence he is frequently surnamed the founder (κτίστης) of the kingdom of Pontus. He also ruled over Cappadocia and Phrygia. He was put to death by Antigonus, B.C. 302, at Cius, in Mysia, at the age of eighty-four, according to Lucian (*Macrob.*, c. 13), because he was suspected of favouring the interests of Cassander.

MITHRIDATES III., son of the preceding, ruled from B.C. 302 to 266.

MITHRIDATES IV., B.C. 240-190?, the son of Ariobarzanes III., was left a minor by his father. He attacked Sinope, which was taken by his successor Pharnaces, and carried on war against Eumenes II. He was in close alliance with the Rhodians, and joined with some other princes of Asia Minor in making valuable presents to that people, to repair their losses after an earthquake. (Polyb., v. 89, 90.) He married the sister of Seleucus Callinicus, by which alliance he obtained Phrygia. His own daughter was married to Antiochus the Great.

MITHRIDATES V., surnamed Evergetes, reigned from about 156 to 120 B.C. He was an ally of the Romans, and assisted them in the third Punic war with a considerable fleet. He was assassinated at Sinope, and was succeeded by his son

MITHRIDATES VI., B.C. 120, surnamed Eupator, and called the Great, was one of the most formidable enemies that the Romans ever encountered. He was only eleven years old at the death of his father; and during his minority his life was frequently in danger from the numerous conspiracies against him. He is said to have been in the habit of taking an antidote discovered by himself, which was sufficient to counteract the effect of the most violent poisons. (Plin., *H. N.*, xxiii. 77; xxv. 3; xxix. 8.) Mithridates possessed a strong mind and a vigorous body; he excelled in all athletic sports, and was distinguished in his early years by his bodily strength and his daring spirit. He had also paid great attention to the study of philosophy and polite literature; and, according to Pliny, was able to converse in twenty-two different languages (*H. N.*, xx. 3).

As soon as Mithridates was old enough to take the government into his own hands, he attacked the Colchi and the other barbarous nations who dwelt on the eastern shores of the Black Sea, whom he reduced to subjection. The next acquisition which he made was Paphlagonia, which was said to have been left to the kings of Pontus by Pylæmenes II., king of Paphlagonia, who died about B.C. 121. Part of Paphlagonia he gave to Nicomedes II., king of Bithynia, who was, next to Mithridates, the most powerful monarch in Asia Minor. Nicomedes however was jealous of the increasing power of Mithridates; and on the death of Ariarathes VII., king of Paphlagonia, who had married a sister of Mithridates, Nicomedes married his widow, and seized the kingdom of Cappadocia, to the exclusion of the son of Ariarathes. Mithridates immediately took up arms in favour of his nephew, defeated Nicomedes, and placed his nephew on the throne under the title of Ariarathes VIII. In a few months afterwards he was murdered by his uncle at a private conference, who placed a son of his own on the vacant throne, and defeated successively the brother of the late king, and a pretender to the throne, whom Nicomedes represented as a son of Ariarathes.

Unable to cope with his formidable enemy, Nicomedes applied to Rome; and the Romans, who had long been anxious to weaken the power of Mithridates, declared both Cappadocia and Paphlagonia to be free states, but allowed the Cappadocians, at their own request, to elect Ariobarzanes as their king. Mithridates however did not tamely submit to the loss of his dominions. He entered into alliance with Tigranes, king of Armenia, to whom he gave his daughter in marriage; and with his assistance he expelled Ariobarzanes from his kingdom, and also deprived Nicomedes III., who had lately succeeded his father, of Bithynia. The two expelled kings applied to the Romans for assistance, who reinstated them in their kingdoms, and sent an army, under the command of Aquilius, to support them.

A war with the Romans was now inevitable, and Mithridates conducted it with the greatest vigour. The Roman armies were defeated one after another; Aquilius was taken prisoner, and put to death by having melted gold poured down his throat; and in B.C. 88 the whole of Asia Minor was in the hands of Mithridates. In the same year he commanded all Romans to leave the country; but before they could do so, they were massacred by the inhabitants of the different provinces of Asia Minor, to the number, it is said, of 80,000. Whether this massacre took place by the command of Mithridates, or was occasioned by the hatred which the Asiatics bore towards the Romans, is doubtful. The islands in the Grecian Archipelago followed the example of the countries on the mainland. Athens also submitted to his power, together with several other places in Greece. The Rhodians, the only people who offered him any vigorous resistance, were attacked, but without success.

In B.C. 87, Sulla arrived in Greece, and immediately commenced the siege of Athens, which was taken on the 1st of March in the following year. Sulla followed up this success by the defeat of Archelaus, the general of Mithridates, near Chæronea, and shortly afterwards by another victory near Orchomenus.

During the successes of Sulla in Greece, the party of Marius had obtained the ascendency in Rome; and Flaccus, who had been consul with Cinna, was sent to succeed Sulla in the command. Flaccus however was put to death by Fimbria, his lieutenant-general, an unprincipled man, but who possessed considerable military talents, and prosecuted the war against Mithridates in Asia with great success. The

victories of Fimbria, and the state of parties at Rome, made Sulla anxious for peace, which was at length agreed upon (B.C. 84) on condition that Mithridates should abandon all his conquests in Asia, and restore Bithynia to Nicomedes, and Cappadocia to Ariobarzanes.

But this war was scarcely finished before Mithridates was again involved in hostilities with the Romans. Mithridates had collected a large army to carry on war against the Colchi. Muræna, who commanded in Asia, perceiving or pretending to perceive a disposition in Mithridates to renew the war, seized the opportunity of enriching himself, and, without any authority from the senate or Sulla, invaded the dominions of Mithridates, and collected much plunder. Mithridates, having in vain complained to the senate, collected an army to defend his dominions, and completely defeated Muræna on the banks of the Halys. But as Sulla was displeased with Muræna for having attacked Mithridates, the peace was renewed, and thus an open rupture was avoided for the present.

During the next eight years Mithridates employed himself in making preparations for a renewal of the war; and in B.C. 75 he broke the treaty which existed between him and the Romans by the invasion of Bithynia. Lucullus was appointed to the command, B.C. 74, and commenced the campaign by besieging Cyzicus, a city on the Propontis, which had been supplied by Mithridates with every description of military stores. In the following year Mithridates made an effort to relieve the town, but was defeated by Lucullus, and obliged to retire to Pontus. He was soon after followed by Lucullus, and having lost another battle at Cabiri, on the borders of Pontus and Bithynia, he fled into Armenia to his son-in-law Tigranes. His own son Machares, who had been appointed king of the wild tribes on the eastern shores of the Euxine, refused to assist his father, and provided for his own safety by making peace with Lucullus.





Coin of Mithridates.
British Museum. Actual size. Silver.

In B.C. 69, Tigranes was completely defeated by Lucullus, during the absence of Mithridates, near his capital Tigranocerta, which was soon after taken by the conqueror. In the following year Tigranes was again defeated, together with Mithridates, near Artaxata; but Lucullus was not able to derive all the advantages he might have done from his victories, in consequence of the mutinous disposition of his troops. [LUCULLUS.] Mithridates was thus enabled to collect another army without opposition; and having returned to Pontus, he defeated the Roman general Triarius, with the loss of 7000 men, before Lucullus could march to his assistance. This victory was followed by others; various parts of Asia Minor again submitted to his authority; and the Romans appeared to be on the point of losing all the acquisitions they had made during the war. But the power of Mithridates had been shaken to its foundation; and on the appointment of Pompey to the command, B.C. 66, the war was soon brought to an end. Mithridates was defeated on the banks of the Euphrates; and in consequence of Tigranes having submitted to Pompey, he fled to the barbarous tribes dwelling to the north of Caucasus, who received him with hospitality and promised him support. The spirit of Mithridates had not yet been broken by adversity; and he purposed, with the assistance of the Colchi and Scythians, to carry into execution a plan which he is said to have formed in his earlier years, namely, of marching through Thracia and Macedonia, and invading Italy from the north. But these plans were frustrated by the plots of his eldest son Pharnaces, who gained over the army to his side, and deprived his father of the throne. Unwilling to fall into the hands of the Romans, Mithridates put an end to his own life, B.C. 63, at the age of 68 or 69, after a reign of fifty-seven years.

(Appian's *Mithridatic War;* Strabo; Livy's *Epitomes;* Plutarch's *Lives of Sulla and Lucullus;* Justin; Velleius Paterculus; Clinton's *Fasti Hellenici*, vol. iii., Appendix 8, 'Kings of Pontus.')

MITHRAS. [MITHRADATES.]

MITHRAX. [MAIIDÆ, vol. xiv., p. 299.]

MITRA. (Zoology.) [VOLUTA.]

MITRAL VALVE. [HEART.]

MITRE (from *mitra*, *μίτρα*, a head-band or diadem), the crown or pontifical ornament worn on the head by archbishops and bishops, and in some instances by abbots, upon solemn occasions. The original meaning of Mitra, as it appears from Homer, is a 'band' or 'belt,' adapted to protect the lower part of the body. It is used by later writers to signify a band for the head, worn by the Greek females; and also more particularly to indicate the head-dress worn by Lydians, Phrygians, and other nations of Asia Minor, which is sometimes called the Phrygian cap or bonnet. It is not known when it was first adopted by the hierarchy. Gough, in his 'Sepulchral Monuments,' vol. i., p. cliii., says, 'The mitres of Christian prelates were borrowed from the Apex or Tutulus of the Flamen Dialis.' The pope has four mitres, which are more or less rich according to the solemnity of the feast-days upon which they are to be worn. The cardinals antiently wore mitres, before the hat, which was first granted to them by the council of Lyon in 1245. Furetière, in his 'Dictionnaire Universelle,' says that it was not till the eleventh or twelfth century that abbots were allowed to wear mitres. The Premonstratensians procured a constitution, which was confirmed by Pope Innocent III., that all the abbots of their order should wear them.

In England the Mitre was certainly used by bishops as early as the time of the Saxons, and continued as long as the Roman Catholic religion was that of the state. Since that time the mitre has appeared only as an heraldic ensign, surmounting the episcopal coat of arms, unless perhaps in some occasional instance, such as Evelyn refers to in his 'Diary.' He says: '20th Dec. 1661.—The bishop of Gloucester preached at the abbey at the funeral of the bishop of Hereford, brother to the duke of Albemarle. It was a decent solemnity. There was *a silver mitre* with episcopal robes borne by the herald before the herse, which was followed by the duke his brother, and all the bishops, with divers noblemen.' (Evelyn's *Memoirs*, vol. i., p. 343.) Antiently, the mitre, as an ornament, seems to have descended from bishop to bishop. Among the Cottonian manuscripts is an order, dated 1st July, 4th Hen. VI., for delivering to Archbishop Chichely the mitre which had been worn by his predecessor. That it was an ornament of great expense may be gathered from the circumstance that Archbishop Pecheham's new mitre, in 1288, cost 173*l.* 4*s.* 1*d.* (See Ducarel's *Excerpts from the Lambeth Registers; MS. Brit. Mus.*)

As an heraldic ornament the mitre of a bishop is only surrounded by a fillet set with precious stones. The archbishop's mitre issues from a ducal coronet.

MITRE'LLA. [VOLUTA.]

MITRE'OLA. [VOLUTA.]

MI'TTIMUS, a legal term applied to certain writs and warrants in which the word *mittimus*, 'We (the king) send,' is expressed or implied.

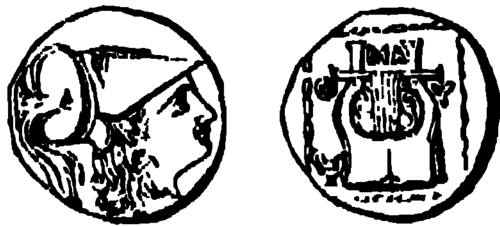
If a record of one court be, for any purpose, required to be transmitted to another, as one court can exercise no direct authority over another, the course is, for a writ to issue out of Chancery, in the king's name, requiring the court in which the record is, to certify the same to the king in Chancery; and when the record is removed into the Court of Chancery by this writ (of *certiorari*), it is sent from the Chancery to the court in which it is wanted by writ of mittimus.

The term is however in more frequent use as applied to the warrant by which magistrates commit and *send* persons charged before them with offences to the proper custody, in order that they may be forthcoming to answer the charge, when ripe for judicial decision. This warrant may be either in the name of the king or in that of the committing magistrate, but the term 'mittimus' is used, even when the latter, which is now the more common course, is adopted.

As to what persons may be committed, the place to which they may be sent, the form of the warrant, &c., see Burns's *Justice*, title 'Criminal Law Commitment,' i.-vii.

MITU, a name for some of the Curassow birds. [CRACIDÆ, vol. viii., p. 129.]

MITYLE'NE. [LESBOS.]



Coin of Lesbos.
British Museum. Actual size.

MIXTURES, in Pharmacy, signify liquid medicines consisting of several ingredients, either in a state of mechanical suspension in some viscid medium, or in a state of complete solution. In preparing these, care must be taken not to mix in the same prescription substances which exercise an antagonizing action on the body, or which are incompatible, from one ingredient decomposing another. Sometimes however it is the substance resulting from the decomposition of one or more of the constituent articles which is wished, as in the compound mixture of iron, and in this case decomposition of the materials is indispensable.

No greater quantity of a mixture should be prepared at one time than is likely to be used before the compound is spoiled, either by the atmosphere, if the materials are of a vegetable kind, or by the action of the various ingredients on each other.

MNE'MIA. [CILIOGRADA, vol. vii., p. 165.]

MNEMONICS. [MEMORY.]

MNEMO'SYNE. [MUSES.]

MOAB (מוֹאָב), a people descended from Moab, the son of Lot by his elder daughter (*Gen.*, xix. 37), and consequently related to the Ammonites, with whom we find them closely connected in their subsequent history. [AMMONITES.] The earliest accounts represent them as dwelling in the country on the east of the Dead Sea and the river Jordan, on both banks of the river Arnon (Wady Modjeb), from which they had driven out the Emim, who were said to be a tribe of giants. (*Deut.*, ii. 11; *Gen.*, xiv. 5.) The plains on the east of the Jordan near its mouth were called from them the Plains of Moab. (*Numb.*, xxii. 1; *Josh.*, xiii. 32; *Deut.*, xxxiv. 1, 8.) Before the invasion of Canaan by the Israelites they had been dispossessed by the Amorites of the country north of the Arnon, which was thenceforth their northern boundary. (*Numb.*, xxi. 13, 26; xxii. 36; *Judges*, xi. 18.) [AMORITES.] At the division of Canaan among the tribes of Israel, this tract of country was given to Reuben and Gad.

By the command of God, the Israelites left Moab in undisturbed possession of their country. (*Deut.*, ii. 9; *Judges*, xi. 15, 18; 2 *Chron.*, xx. 10.) But while the Israelites, after conquering the Amorites, were encamped in the plains of Moab, Balak, the king of Moab, sent for the prophet Balaam to curse them. (*Numb.*, xxii.—xxiv.) Balaam found himself compelled by a divine impulse to bless the people whom he meant to curse, but was more successful in seducing them to the licentious worship of Baal-peor by means of the daughters of Moab. (*Numb.*, xxv. 1; xxxi. 16; *Rev.*, ii. 14.) For this offence, and for neglecting to assist the Israelites on their march, the Moabites were excluded from the congregation of God to the tenth generation. (*Deut.*, xxiii. 3, 4; *Nehem.*, xiii. 1, 2.)

In the time of the Judges, Moab, in league with the children of Ammon and Amalek, invaded the land of the Israelites, and ruled over them for eighteen years. They were at last delivered by Ehud, who assassinated Eglon, the king of Moab. (*Judges*, iii. 12-30.) After this time it appears from the book of *Ruth* that there was a period of friendly intercourse between the two nations. Saul warred against Moab (1 *Sam.*, xiv. 47), and David made them tributary to Israel (2 *Sam.*, ii. 8). The tribute which they paid consisted of sheep and lambs. (2 *Kings*, iii. 4.) After the partition of the kingdom, we find Moab subject to the king of Israel, against whom they rebelled after the death of Ahab, in B.C. 897. (2 *Kings*, i. 1; iii. 5; and *Is.*, xvi. 1.) Jehoram, the son of Ahab, assisted by Jehoshaphat, king of Judah, defeated them in a great battle, but failed to subdue them. (2 *Kings*, iii. 6-27.) Soon after this, Moab, with the Ammonites and other nations, invaded Judah, but the invaders quarrelled among themselves and destroyed each other. (2 *Chron.*, xx.) In the reign of Joash, about B.C. 838, the Moabites again made incursions upon Israel. (2 *Kings*, xiii. 20.) It is probable that after the tribes of Reuben and Gad had been carried captive by Tiglath-pileser (about B.C. 740), the Moabites recovered the country they had formerly possessed north of the Arnon, for Isaiah (xv., xvi.) speaks of towns of the Moabites in that district; but from the same prophecy it would appear that they were again driven back over the Arnon by the Assyrians. In common with the other nations on the borders of Palestine, the Moabites were subdued by Nebuchadnezzar, under whom they made war upon Judah. (2 *Kings*, xxiv. 2.) From *Jeremiah*, xxvii., it would appear that near the beginning of the reign of Zedekiah, the Moabites and other neighbouring nations endeavoured to persuade him to revolt from Nebuchadnezzar, but without immediate success, as the rebellion of Zedekiah did not take place till about the ninth year of his reign. (2 *Kings*, xxiv. 20; xxv. 1.) According to Josephus, the Moabites and Ammonites were reduced to subjection by Nebuchadnezzar in the fifth year after the destruction of Jerusalem. (*Antiq.*, x. 9, 7). This may have been the event referred to in the prophecies of Ezekiel (xxv. 8-11) and Zephaniah (ii. 8-11). The Moabites are incidentally mentioned in several other passages of the Old Testament and by Josephus. The prophecies contain many threatenings against them. Their name ultimately disappeared in that of the Arabians.

The Moabites were a pastoral people. (2 *Kings*, iii. 4.) Their country was well adapted for rearing cattle, and also produced corn and wine. (*Ruth*, i. 1; *Is.*, xvi. 8-10.) It contained many mountains and fertile valleys, and was well watered by the Arnon, the Zered, and other rivers which fall into the Dead Sea. It is called by Josephus Μωαβῖτις. (*Bell. Jud.*, iii. 3. 3; iv. 8. 2), and corresponds to part of the present district of Kerek. Several cities of Moab are mentioned in the Old Testament. (*Is.*, xv., xvi., &c.) The capital was Ar or Rabbath-Moab (*Deut.*, ii. 9), afterwards called Areopolis. Its ruins, which still retain the name of Rabba, lie about 25 miles south of the Arnon, near a stream which is now called Beni-Hamed. Jerome states that the city was destroyed by an earthquake in his youth. The country of Moab was well peopled, as is proved by the numerous ruins found there. The Moabites were governed by kings (*Numb.*, xxii. 4; *Judges*, iii. 12; 1 *Sam.*, xxii. 3; *Jer.*, xxvii. 3) and inferior princes (*Numb.*, xxii. 8, 14; xxiii. 6). Their religion was the licentious idolatry of Baal-peor and Chemosh (*Numb.*, xxv. 1-4; 2 *Kings*, xxiii. 13). In cases of extreme danger, they offered human sacrifices (2 *Kings*, iii. 27).

(Relandi, *Palestina*; Calmet's *Dictionary*; Winer's *Biblisches Realwörterbuch*; Burckhardt's *Travels in Syria*.)

MOALLAKÂT. [ARABIA, p. 219.]

MOBILE. [ALABAMA.]

MOCARANGUA, or **MONAMATAPA**. [SOFALA.]

MOCHA. [ARABIA.]

MOCKING BIRD, the vulgar name for that singular songster the *Mimic Thrush* of Latham, *Turdus polyglottus* of Linnæus and authors, *Orpheus polyglottus* of Swainson, and *Mimus polyglottus* of Boie.

Generic Character. [MERULIDÆ, ante, p. 122.]

Description.—Male. Upper parts of the head, neck, and back, dark brownish ash; and, when new-moulted, a fine light grey; wings and tail nearly black, the first and second rows of coverts tipped with white; primary coverts, in some males wholly white, in others tinged with brown. Three first primaries white from their roots as far as their coverts; white on the next six, extending from an inch to one and three-fourths farther down, descending equally on both sides of the feather; the tail is cuneiform, the two exterior feathers wholly white; the rest, except the middle ones, tipped with white; chin white; sides of the neck, breast, belly, and vent, a brownish-white, much purer in wild birds than in those that have been domesticated; iris of the eye yellowish cream-coloured, inclining to golden; bill black, the base of the lower mandible whitish; legs and feet black and strong.

Female. Very much resembling the male, but the white is less pure, spreads over only seven or eight of the primaries, does not descend so far, and extends considerably farther down on the broad than on the narrow side of the feathers. The black is also more of a brownish cast.

Young birds with the breast spotted like that of a thrush: *young male* with the white on the wing broader and of greater purity than in the female. (Wilson.)

Habits, Reproduction, &c.—The extraordinary vocal powers of this wonderful song-bird and his lively habits, as recorded by eye and ear witnesses, are so uncommon, that we should think we were reading of some magical

bird in a fairy tale, did we not know the fidelity and accuracy of the excellent observers who describe it. Wilson thus portrays this polyglot:—

'The ease, elegance, and rapidity of his movements, the animation of his eye, and the intelligence he displays in listening and laying up lessons from almost every species of the feathered creation within his hearing, are really surprising, and mark the peculiarity of his genius. To these qualities we may add that of a voice, full, strong, musical, and capable of almost every modulation, from the clear mellow tones of the wood-thrush, to the savage scream of the bald eagle. In measure and accent he faithfully follows his originals. In force and sweetness of expression he greatly improves upon them. In his native groves, mounted on the top of a tall bush or half-grown tree, in the dawn of dewy morning, while the woods are already vocal with a multitude of warblers, his admirable song rises pre-eminent over every competitor. The ear can listen to his music alone, to which that of all the others seems a mere accompaniment. Neither is this strain altogether imitative. His own native notes, which are easily distinguishable by such as are well acquainted with those of our various song-birds, are bold and full, and varied seemingly beyond all limits. They consist of short expressions of two, three, or at the most five or six syllables, generally interspersed with imitations, and all of them uttered with great emphasis and rapidity, and continued with undiminished ardour for half an hour or an hour at a time. His expanded wings and tail, glistening with white, and the buoyant gaiety of his action, arrest the eye, as his song most irresistibly does the ear. He sweeps round with enthusiastic ecstacy; he mounts and descends as his song swells and dies away; and, as my friend Mr. Bartram has beautifully expressed it, "He bounds aloft with the celerity of an arrow, as if to recover or recal his very soul, expired in the last elevated strain." While thus exerting himself, a bystander, destitute of sight, would suppose that the whole feathered tribes had assembled together on a trial of skill, each striving to produce his utmost effect, so perfect are his imitations. He many times deceives the sportsman, and sends him in search of birds that perhaps are not within miles of him, but whose notes he exactly imitates; even birds themselves are frequently imposed on by this admirable mimic, and are decoyed by the fancied calls of their mates, or dive with precipitation into the depths of thickets at the scream of what they suppose to be the sparrow-hawk.

'The Mocking Bird loses little of the power and energy of his song by confinement. In his domesticated state, when he commences his career of song, it is impossible to stand by uninterested. He whistles for the dog; Cæsar starts up, wags his tail, and runs to meet his master. He squeaks out like a hurt chicken, and the hen hurries about with hanging wings and bristled feathers, clucking to protect its injured brood. The barking of the dog, the mewing of the cat, the creaking of a passing wheelbarrow, follow with great truth and rapidity. He repeats the tune taught him by his master, though of considerable length, fully and faithfully. He runs over the quiverings of the canary and the clear whistlings of the Virginia nightingale, or red-bird, with such superior execution and effect, that the mortified songsters feel their own inferiority, and become altogether silent, while he seems to triumph in their defeat by redoubling his exertions. This excessive fondness for variety however, in the opinion of some, injures his song. His elevated imitations of the brown thrush are frequently interrupted by the crowing of cocks; and the warblings of the blue-bird, which he exquisitely manages, are mingled with the screaming of swallows or the cackling of hens: amidst the simple melody of the robin we are suddenly surprised by the shrill reiterations of the whip-poor-will, while the notes of the kill-deer, blue-jay, martin, baltimore, and twenty others succeed, with such imposing reality, that we look round for the originals, and discern with astonishment that the sole performer in this singular *concert* is the admirable bird now before us. During this exhibition of his powers, he spreads his wings, expands his tail, and throws himself around the cage in all the ecstacy of enthusiasm, seeming not only to sing, but to dance, keeping time to the measure of his own music. Both in his native and domesticated state, during the solemn stillness of night, as soon as the moon rises in silent majesty, he begins his delightful solo; and serenades us the live-long night with a full display of his vocal powers, making the whole neighbourhood ring with his inimitable medley.'

Audubon is of opinion that in song it is far beyond the nightingale. He pronounces the notes of that bird to be equal to those of a *soubrette* of taste, who, could she study under a Mozart, might perhaps, in time, become very interesting in her way. But he thinks it quite absurd to compare her essays to the finished talent of the Mocking Bird. In confinement its melody, though very beautiful, falls far short, in his judgment, of its 'wood-notes wild.' He describes its imitative powers as amazing, and says that these birds mimic with ease all their brethren of the forests or of the waters, as well as many quadrupeds; but though he has heard that the bird possesses the power of imitating the human voice, he never met with an instance of that mimicry.

The last-mentioned author gives us a most interesting detail of the loves of these charming birds amid the rich scenery where the great Magnolia, with its thousand beautiful flowers, Bignonias, the white-flowered Stuartia, and the golden orange, are intertwined with innumerable vines. 'For awhile,' continues this graphic describer, 'each long day and pleasant night are thus spent; but at a peculiar note of the female he ceases his song, and attends to her wishes. A nest is to be prepared, and the choice of a place in which to lay it is to become a matter of mutual consideration. The orange, the fig, the pear-tree of the gardens, are inspected; the thick briar patches are also visited. They appear to be well-suited for the purpose in view: and so well does the bird know that man is not his most dangerous enemy, that instead of retiring from him, they at length fix their abode in his vicinity, perhaps in the nearest tree to his window. Dried twigs, leaves, grasses, cotton, flax, and other substances are picked up, carried to a forked branch, and there arranged. The female has laid an egg, and the male redoubles his caresses. Five eggs are deposited in due time, when the male, having little more to do than to sing his mate to repose, attunes his pipe anew. Every now and then he spies an insect on the ground, the taste of which he is sure will please his beloved one. He drops upon it, takes it in his bill, beats it against the earth, and flies to the nest to feed and receive the warm thanks of his devoted female.'

The eggs are pale green, blotched and spotted nearly all over with umber brown. The female sits fourteen days.

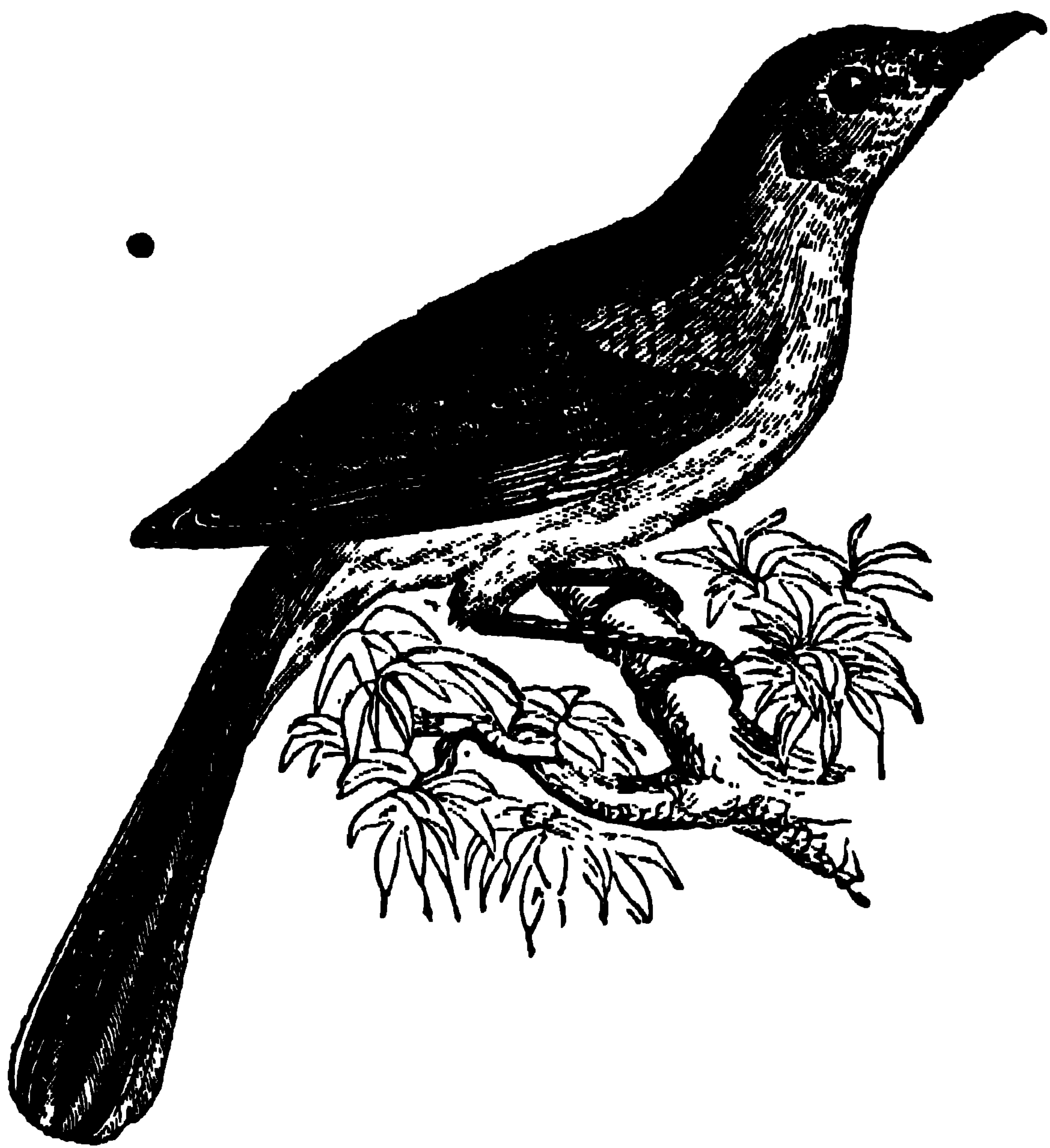
The enemies of the Mocking Bird are cats, the *Falco Stanleii*, and snakes, especially the black snake, which Wilson describes as the mortal enemy of our songster's eggs and young, and as the object of his especial and deadly vengeance; for the bird rarely leaves his foe, when he has found him, alive. 'Children,' says Audubon, 'seldom destroy the nests of these birds, and the planters generally protect them. So much does this feeling prevail throughout Louisiana, that they will not willingly permit a Mocking Bird to be shot at any time.'

The food of this species consists, according to Wilson, of the berries of the red cedar, myrtle, holly, and many species of Smilax, together with gum-berries, gall-berries, and a profusion of others with which the swampy thickets abound, as well as winged insects, of which it is exceedingly fond.

Geographical Distribution.—'The Mocking Bird,' says Wilson, 'inhabits a very considerable extent of both North and South America, having been traced from the states of New England to Brazil, and also among many of the adjacent islands; much more numerous in those states south than in those north of the river Delaware, being generally migratory in the latter, and resident (at least many of them) in the former. A warm climate and low country, not far from the sea, seem most congenial to their nature; accordingly we find the species less numerous to the west than east of the great range of the Alleghany, in the same parallels of latitude. In the severe winter of 1808-9, I found these birds occasionally from Fredericksburg in Virginia to the southern parts of Georgia.'

Nuttall states that it inhabits the whole continent and the adjacent islands, from Rhode Island to the larger islands of the West Indies, continuing through the equatorial regions, and as far south as Brazil. Nor is it confined to the eastern or Atlantic states; for it is found in the territory (now state) of Arkansas, and more than a thousand miles from the mouth of Red River. Say notices it as breeding at the western sources of the Platte, near the base of the Rocky

Mountains. Bullock saw it on the table-land of Mexico. Mr. Litchfield informed Nuttall that it is commonly heard in Venezuela.



[The Mocking Bird.]

Mr. Darwin (*Journal and Remarks*) notices, in his account of Maldonado, a mocking-bird, *Orpheus Modulator*, called by the inhabitants Calandria, as remarkable for possessing a song far superior to that of any other bird in the country: indeed it was nearly the only bird in South America which he observed to take its stand for the purpose of singing. He compares the song to that of the sedge-warbler, but says that it is more powerful, and that some harsh notes and some very high ones are mingled with a pleasant warbling. It is heard only during spring: at other times its cry is harsh, and far from harmonious. He states that near Maldonado these birds were tame and bold, constantly attending the country-houses in numbers, to pick the meat which was hung up on the posts or walls; but if any other small bird approached, the Calandria drove it away. Mr. Darwin adds, that, on the wide uninhabited plains of Patagonia, another closely allied species, *Orpheus Patagonicus* of D'Orbigny, which frequents the valleys clothed with spiny bushes, is a wilder bird, and has a slightly different tone of voice. (*Voyages of H.M.S. Adventure and Beagle*, vol. iii.)

Mr. Swainson (*Fauna Boreali-Americana*, vol. ii., and *Classification of Birds*, vol. ii.) notices the striking analogy between the Mocking Bird and *Lanius Carolinensis* (the *Loggerheaded Shrike*). Both the birds, he remarks, are typical examples of two distinct groups: they are of the same size, clothed in nearly the same coloured plumage, seek the same kind of food, agree in the structure of their wings and tail (almost in that of their feet), build the same kind of nest and in similar situations, imitate the notes of other birds, eject their unserviceable food in the same manner, and yet, in his opinion, are totally distinct in real affinity.

N.B. The term *Mock-Bird* is sometimes used to designate the Sedge-Bird (*Curruca salicaria* of Fleming, *Sylvia Phragmitis* of Bechstein, *Calamodyta Phragmitis* of Bonaparte; and that of *Mock Nightingale* is sometimes applied to the Black-cap [BLACK-CAP], and also to the Fauvotte, *Curruca hortensis*, Br. and Flem., *Motacilla hortensis*, Gm., *Sylvia hortensis*, Bechst.

MODBURY. [DEVONSHIRE.]

MODE, in Antient Music, is the order of the sounds forming what may, in modern language, be called the different scales.

The antients differed exceedingly among themselves in their definitions and on the divisions and names of their modes or keys. Obscure on every musical subject, they are nearly unintelligible on this: they all agree however that a mode is a certain system of sounds, and it appears that this system or succession is in itself nothing but a given diapason, or octave, made up of all the intermediate sounds, according to the genus.

In the earliest Greek music whereof we have any account there were but three modes, of which the key-notes were at the distance of one tone from each other. The lowest of these was called the *Dorian*, the highest the *Lydian*, and the *Phrygian* was placed between the other two. Subsequently, by dividing the tones into semitones, two other modes were produced—the *Ionian* and the *Æolian*, the first of which was placed between the Dorian and Phrygian, and the second between the Phrygian and Lydian. At length, by extending the system above and below, new modes were established, which took their names from the former five, adding the preposition *hyper* (ὑπέρ, *above*) for the higher, and *hypo* (ὑπό, *below*) for the lower. Thus the Lydian mode was followed by the Hyper-Dorian, the Hyper-Ionian, &c., in ascending; and after the Dorian mode followed the Hypo-Lydian, the Hypo-Æolian, &c., in descending. The following table of the fifteen modes, with the modern names of the sounds, is given by Rousseau, from Alypius, who wrote an account of the Greek *Semeiotica*, and is one of the seven authors published by Meibomius:—

Acute. (*High.*)	15	B	Hyper-Lydian.
	14	B♭	Hyper-Æolian.
	13	A	Hyper-Phrygian.
	12	A♭	Hyper-Ionian.
	11	G	Hyper-Dorian, or Mixo-Lydian.
Mean	10	F♯	Lydian.
	9	F	Æolian.
	8	E	Phrygian.
	7	E♭	Ionian.
	6	D	Dorian.
Grave. (*Low.*)	5	C♯	Hypo-Lydian.
	4	C	Hypo-Æolian.
	3	B	Hypo-Phrygian.
	2	B♭	Hypo-Ionian.
	1	A	Hypo-Dorian.

In the *Essai sur la Musique*, by M. Laborde, is a most comprehensive table of the modes, with the Greek musical characters, &c.; and in the *Philosophical Transactions* (vol. li., part 2) will be found a table of the same kind, to 'show the tuning of the lyre in every mode,' by Sir Francis Styles, a most industrious inquirer, and a very learned original writer on the subject.

Of all these modes, Plato rejected some, thinking them capable of operating prejudicially on the manners; and Ptolemy reduced the number to seven; the latter therefore confined all the modes within the compass of an octave, of which the Dorian mode is the centre, so that the Mixo-Lydian was a 4th above, and the Hypo-Dorian a 4th below; the Phrygian a 5th above the Hypo-Dorian; the Hypo-Phrygian a 4th below the Phrygian; and the Lydian a 5th above the Hypo-Phrygian: whence results the following order:—

1	F	Mixo-Lydian.
2	E	Lydian.
3	D	Phrygian.
4	C	Dorian.
5	B	Hypo-Lydian.
6	A	Hypo-Phrygian.
7	G	Hypo-Dorian.

From these seven modes, with the Hypo-mixo-Lydian—added, it is said, by Guido—were formed the eight ecclesiastical modes, or tones of the Catholic Church.

If we really understand the nature of the degrees by which the antients completed their diapason, or octave, in the various modes, many of these modes would be very displeasing to modern ears; but the probability is, that something remains to be explained; and whether any new light will ever break in on the subject, is exceedingly doubtful.

We have considered the modes as only differing in regard to grave and acute, that is, in pitch; but there are other circumstances on which their effect, perhaps, much depended, such as the poetry set to the music, the nature of the accompanying instrument, the rhythm or cadence of the verse, and the peculiar tastes or feelings of the people from whom the chief modes were named, as the Dorian, Phrygian, &c. Fearing that the knowledge of these matters will not much advance beyond the point it has already reached, we cannot indulge the hope that the subject

will ever be thoroughly understood. Such seems to be the opinion of nearly all writers on the antient modes, particularly Rousseau, from whom we have freely translated the greater part of this article.

Mode, in modern musical language, signifies the same as Key; but, though a far more convenient term, is very rarely used in that sense in our isles. [KEY.]

MODELS, ARCHITECTURAL. Besides the usual delineations upon paper showing the plans and different parts of a building, and their details in elevations, sections, and working drawings [DESIGN; ARCHITECTURE], a solid representation or miniature facsimile of the proposed edifice is sometimes formed, in order to give a more distinct idea of it than can be obtained from a number of separate drawings by those who are unable to comprehend them perfectly, and combine them together mentally so as to figure to themselves a complete and distinct image of the whole. Models of this kind are variously executed, and more or less finished up, as may be required. Sometimes they are of wood, either coloured or not; and if economy is studied, the capitals of the columns, the cornices, and all other decorative parts are merely blocked out in the rough, the mouldings and ornaments being omitted. But the material now more generally used is plaster of Paris, because columns and other parts that require much carving may be cast in moulds, and afterwards finished up with comparatively very little trouble or expense. Models of this kind are very beautiful, not only on account of the superior neatness of their execution, but their texture and colour also. The pure and dazzling whiteness of the latter is however rather a fault than otherwise, because it prepossesses the eye too much, and shows the building of a pure uniform hue, many degrees whiter than the whitest stone, even before it becomes at all discoloured. It would be better therefore were such glaring whiteness subdued, either by mixing up some colour in the plaster, so as to give it more of a natural stone tint; or else, by washing over the model itself after it is finished. Another material employed for making architectural models is card-board, applied in surfaces of various thicknesses; and although it seems fitted only for very plain buildings, it is capable of being wrought so as to express the most minute and elaborate tracery and other ornaments in Gothic architecture; besides which, models thus formed are said to be less susceptible of injury than those in plaster, and may be more easily coloured to represent the different materials—stone, brick, wood-work, slate, &c. They are however more expensive, being attended with much greater labour, and requiring to be built up, as it were, like the edifice itself. A very elaborate model of Cossey Hall, in Norfolk (executed by Mr. T. Dighton, and now, we believe, in the possession of the Institute of Architects), shows the very great perfection to which that species of modelling has been brought; for the profusely enriched chimney-shafts, the beautiful oriels, and all the other ornamental details of that building (unfortunately still in an unfinished state), are wrought up in the most exquisite and artist-like manner; and the whole is coloured so as to describe the actual materials of the edifice itself.

Models are by no means so generally made use of as they ought to be, on account of their expensiveness; but when a building of great magnitude is to be erected, the cost of a model, although it may be considerable in itself, becomes a mere trifle in the sum-total. Where merely the façade of a building will be exposed to view, a model may be dispensed with, as a simple elevation will answer the purpose perhaps quite as well. But for one that is insulated, or is at all complex, a model becomes desirable: the same again if a façade is composed of many parts or surfaces, some projecting, others retiring, the effect of which cannot else always be so distinctly foreseen as it ought to be, at least not except perspective drawings be made of it from several different distances and points of view; and if there be many of these, they will be hardly less expensive than a model itself. Besides, even when an architect has thoroughly considered all his preparatory drawings, he may still find out something that, if not absolutely faulty, might be considerably improved—something that he had thought would have had a different effect, and which therefore, if detected in the model, can still be remedied.

For showing the internal parts of a building, models are of comparatively little use, since they may be far more distinctly understood by means of plans of the different floors and sections. Indeed, unless a model be made to open, or be so constructed that either one or more of its sides may be removed at pleasure, so as to lay open the interior, the inside of a building can hardly be shown at all in a model. Hence models are very seldom indeed resorted to for such purpose, and then only to show a single large apartment, such as the interior of a church, or something of that sort, whose construction requires to be so explained; for it is hardly necessary to observe that the most accurate and best-executed model cannot in such cases give the effect of the building itself as viewed when we stand *within* it.

After all, useful and satisfactory as models are, they are apt in some degree to mislead unless due precaution be taken to guard against misconceptions. As a miniature representation of a building, more especially if it be beautifully finished up, a model possesses a certain *prettiness* of its own which captivates the eye, and is likely to cause it to overlook the commonplace or trivial character perhaps of the design so shown. Another imperfection attending a model is that it conveys no idea of the situation, but merely shows the building itself, apart from all its accessories, probably its disadvantages, of locality. A model of St. Paul's, for instance, may be viewed in any direction, and from any distance, whereas the building itself can be seen only by looking directly up at it, except from one or two points. It is necessary therefore that any delusion of this kind should be carefully guarded against, at least in an edifice of importance, by an exact plan of the situation, and one or more views, as may be, showing it as it will actually appear when erected.

On the other hand, it is one circumstance greatly in favour of models, that after they have served their first purpose, they have their value as ornamental works of art. In fact, *portrait* models of celebrated edifices are frequently introduced as such in libraries and galleries, either as restorations of the original structures, or showing them as dilapidated by time. For those of the last-mentioned kind cork is the material usually made use of, it being well calculated to express of itself the ruggedness and flaws of decayed stone buildings.

MO'DENA, DUCHY OF, a state of North Italy, extending north of the central ridge of the Apennines towards the Po, from which river it is separated by the territory of Guastalla belonging to Parma, and also by a part of the duchy of Mantova, which lies on the south bank of the Po. It is bounded on the west by the duchy of Parma; south-west by the Garfagnana, which lies on the opposite or southern slope of the Apennines, and part of which belongs also to the duke of Modena [GARFAGNANA]; on the south by Tuscany, and on the east by the Papal State. This, which is the duchy of Modena Proper, must be distinguished from the states belonging to the duke of Modena, which include several districts and principalities south of the Apennines, and extending to the coast of the Mediterranean, namely, Garfagnana Estense, Lunigiana Estense, and the duchy of Massa and Carrara. [MASSA; CARRARA.]

The administrative divisions are: 1. Province of Modena, which is by far the largest, containing 225,000 inhabitants, and is divided into twenty communes, Modena, Mirandola, Carpi, Finale, Sassuolo, Vignola, Pavullo, San Felice, Nonantola, Montefiorino, Montefestino, Concordia, Guiglia, Montese, Formigine, Spilamberto, Sestola, San Martino in Rio, Fiumalbo, Pieve a Pelago. 2. Province of Reggio, which extends west of that of Modena, and contains 94,000 inhabitants, distributed into twelve communes, namely, Reggio, Correggio, Scandiano, Brescello, Novellara, Montecchio, Castelnuovo ne' Monti, Carpineti, Minozzo, Santo Polo, Castelnuovo di Sotto, Castellarano. 3. Province of Garfagnana Estense, with 28,000 inhabitants, distributed among fifteen communes, namely, Castelnuovo, Castiglione, Fosciandora, Pieve Fosciana, Villa Collemandina, Camporgiano, Careggine, Giucugnano, Piazza, San Romano, Sillano, Vaglisotto, Molazzana, Trassilico, Vergemoli. 4. Province of Lunigiana, being part of the valley of the Magra, which was called in the middle ages Lunigiana, from the antient town of Luni, long since ruined, the bishops of which had feudal jurisdiction over part of this mountainous and sequestered region, and the Marquises Malaspina over the other. It is now divided between the states of Modena, Sardinia, and Tuscany. The part belonging to Modena, called Lunigiana Estense, consists of ten communes, containing altogether about 12,000 inhabitants. The communes are: Fosdinovo, which is the residence of the delegate or governor of the province, Aulla, Licciana,

Villafranca, Tresana, Mulazzo, Rocchetto, Treschietto, Podenzana, Varano. 5. Province of Massa, with two communes, Massa and Carrara, and 20,000 inhabitants.

The greatest length of the whole territory belonging to the duke of Modena, or 'Stati Estensi,' is about 88 miles, from north-east to south-west, from the borders of Ferrara to the sea-coast of Carrara. Its width north of the Apennines varies from 30 to 34 miles, but it is only about ten miles wide in the part south of that ridge and along the sea-coast. The whole area may be reckoned at about 2000 English miles, or about that of the county of Norfolk, and the population was reckoned, by the census of 1828, at 379,000. About one-half of this territory is covered by the chain of the Apennines and its offsets, which slope gradually towards the north; one-third more forms part of the great plain of Lombardy, and is very fertile; and a small but favoured strip extends along the shores of the Mediterranean. Of the mountainous part some valleys are tolerably fertile, but the greater part is either rocky or covered with oak and chestnut trees. The highest summits of the Apennines are, Monte Cimone (7000 feet) and Camporaghena (6500). The snow generally leaves these summits in the month of April. The principal rivers of the Modenese territory, which have their sources in the Apennines and run into the Po, are: 1. The Secchia, which rises in the Apennines of Camporaghena, and flowing through the whole length of the duchy of Modena, passes near the capital, receives many affluents, supplies numerous canals for irrigation, and, after a winding course of nearly 100 miles, enters the Po within the borders of Mantua. 2. The Panaro rises at the foot of Mount Cimone, and running in a parallel direction to the Secchia, waters the eastern part of the duchy, and then enters the territory of Ferrara, where it falls into the Po. Both these rivers are navigable for boats from the neighbourhood of Modena to the Po. 3. The Crostolo rises in one of the lower ridges of the Apennines, passes near Reggio and by Guastalla, below which it enters the Po. The canal Tassoni, which communicates with the Crostolo, is about 14 miles long. In the plain of Modena, Artesian wells have been in use from time immemorial; many of them are of very considerable depth, and the supply of water is abundant. [ARTESIAN WELLS.] South of the Apennines the Magra, which rises in the Apennines north of Pontremoli, crosses the Modenese territory of Lunigiana, and enters the sea west of Carrara. Two smaller streams, the Avenza and the Frigido, water the territory of Massa and Carrara. The Serchio is the river of Garfagnana. Two roads cross the central Apennines, and make a communication between the northern and southern divisions of the Modenese states; one road leads from Reggio to Fivizzano and Aulla in the valley of the Magra; another from Modena to Castel Nuovo in the Garfagnana, and from thence to Massa. The chief products of the country are corn, Indian corn, pulse, hemp, oil, wine, silk, and fruits. Polenta, or pudding of Indian corn, flour, beans, and chestnuts in the mountain districts south of the Apennines, are the principal articles of food for the peasantry. Horned cattle and swine are exported in considerable numbers. The other articles of exportation are fruit, silk, corn, brandy, wine, and vinegar. The manufactures of the duchy consist of woollens, silks, gauzes, paper, straw-hats, glass, and pottery. There are abundant sources of petroleum in several parts of the duchy.

The government of Modena is the most absolute in Italy, there being no provincial states of any kind. The present duke, Francis IV. of Este, is the son of Ferdinand, archduke of Austria, and of Maria Beatrice of Este, the last descendant of the houses both of Este and Cibo. For the manner in which the Este obtained the sovereignty of Modena, see ESTE, HOUSE OF. The revenue of the state amounts to 6,860,000 francs (about 274,400*l.*)

The judicial establishment consists of two supreme courts, one at Modena, and the other at Massa; and two secondary courts, one at Modena, and the other at Reggio. There are also giusdicenze, or courts of 'première instance,' in every canton or district, each of which embraces several communes. For municipal matters, each commune has its podesta, or sindaco, and a municipal council. The Codice Estense, a compilation made by the later dukes of the house of Este, in the latter part of the eighteenth century, is the law which is in force.

The military consist of a battalion of infantry of the line of eight companies, a battalion of light infantry of six companies, three companies of dragoons, a company of artillery, one of pioneers, and one of veterans. These corps are recruited by voluntary enlistment with bounty money. There are two 'battaglioni urbani,' a kind of civic guard, one at Reggio and the other at Modena, besides a guardia nobile, or body guards, who attend the sovereign and his family. There is a military academy at Modena.

The establishments for public instruction consist of one lyceum at Modena; five colleges for the study of the law and medicine at Modena, Reggio, and Mirandola; three schools of philosophy, at Carpi, Correggio, and Castelnuovo, the chief town of Garfagnana; besides several colleges for boarders kept by the Jesuits and other religious orders. There are five establishments for female education, kept by nuns, four of which are at Modena, one at Reggio, and two at Carpi. For elementary education there are six schools for boys and six for girls, distributed among the various towns; but there is no general system for the rural communes. There are also seven special schools, namely, the academy of the fine arts, the military academy, the institute of cadets, a veterinary school, a school of sculpture at Carrara, and a deaf and dumb school.

For religious purposes the country is divided into four bishoprics, Modena, Reggio, Carpi, and Massa, and 649 parishes. Besides the chapters in each bishop's see, there are six collegiate churches, namely, S. Maria in Pomposa, and S. Consorzio, in the diocese of Modena; S. Prospero, S. Niccolo, and Gualtieri, in the diocese of Reggio; and S. Andrea at Carrara; besides the abbey of Nonantola. There are also ten clerical seminaries, one in each town of the state. The monastic clergy are more numerous in proportion than in most other parts of Italy; there are seventeen convents of men and nine of women. About 3000 Jews reside at Modena, Reggio, and other towns of the duchy.

The principal towns of the states of Modena are—1. MODENA. 2. Reggio, the Regium Lepidi of the Romans, a walled town in the midst of a fine and fertile plain, is well built, is a lively place, has several handsome churches, especially the cathedral; a lyceum, which possesses the collection of natural objects that once belonged to Spallanzani; a handsome new theatre; an old castle, in which Ariosto was born; some manufactories of linen and silks; and nearly 20,000 inhabitants. A great fair takes place annually at Reggio in the month of March. Not far from Reggio are the ruins of the famous castle of Canossa, where Gregory VII. received the humiliating homage of the emperor Henry IV. in 1077. 3. Mirandola, once a separate principality belonging to the family of Pico, is an old looking town, in a low unhealthy flat in which rice is grown: it has several churches, and about 4600 inhabitants. 4. Finale on the Panaro, near the borders of Ferrara, has 6000 inhabitants. 5. Correggio, with 2500 inhabitants, was the birth-place of the great painter Antonio Allegri, called il Correggio. 6. Concordia, on the Secchia, has 3000 inhabitants. 7. Carpi, on the high road from Modena to Mantua, has 3000 inhabitants, an old castle, and some manufactories. (Serristori; Neigebaur.)

MO'DENA, The Town of, is situated in 44° 37′ N. lat. and 10° 57′ E. long., in the centre of a wide plain which forms part of the great basin of the Po, and between the rivers Panaro and Secchia, which are here joined by a canal. It is the capital of the Modenese territories, and the residence of the duke. Modena is well built, and has several handsome churches and palaces. Most of the streets have arcades on each side; the principal street, which crosses the town in its length, is handsome. The ducal palace is vast and splendid, of a noble style of architecture, with a handsome court before it, surrounded by a colonnade; it is, in fact, a magnificent princely residence, such as one would not expect to find in the capital of a small duchy. The grand staircase; the principal apartments with their rich furniture; the gallery of paintings by Guido, Guercino, the two Carracci, Garofalo, and other great masters; the valuable library, 'Biblioteca Estense,' which contains 90,000 printed volumes and 3000 MSS., and which has had two illustrious librarians, Muratori and Tiraboschi,—all these render the palace of Modena one of the most interesting in Italy. The fine gardens are open to the public. The cathedral, a Gothic building of the eleventh century, is remarkable chiefly for its lofty square marble tower, called 'La Ghirlandina,' in which is kept the

famous bucket, which was the cause of war, in the thirteenth century, between Modena and Bologna, and forms the subject of Tassoni's mock-heroic poem, 'La Secchia Rapita.' The church of S. Agostino contains the tombs of two illustrious Modenese, Sigonio and Muratori. The other remarkable buildings of Modena are, the handsome theatre, the college, the infantry barracks, the hospital, and the old citadel, which is now used as a penitentiary and a workhouse for the prisoners, who are employed in several manufactures. A canal communicating with the Panaro affords a line of boat navigation between Modena and the Po, and by the latter river with Venice and the coast of the Adriatic.

Modena contains 25,000 inhabitants. (Serristori, *Saggio Statistico.*) It lies on the high road from Lombardy to Florence, Rome, and Naples, and is 40 miles south of Mantua, 105 south-east of Milan, 20 north-west of Bologna, and 60 north by west of Florence. Two roads lead from Modena to Florence: one, which is the most frequented, passes by Bologna; the other leads across a wild tract of the Apennines, near Mount Cimone, and descends into the valley of the Arno, by Pistoia. Mutina, which is the antient name of Modena, is said to have been founded by the Etruscans; it afterwards became a Roman colony. It was at Mutina that hostilities first began, after the death of Cæsar, between Antony and the senatorial troops under Decimus Brutus, who shut himself in the town. Two battles were fought under its walls, in the month of April, B.C. 43, in which Antony was defeated, and the two consuls, Hirtius and Pansa, were killed.

In the neighbourhood of Modena is Sassuolo, the ducal country residence and gardens. The fortress of Rubiera, which is the principal stronghold in the duchy, is on the road from Modena to Reggio. (Serristori; Neigebaur; Valéry.)

MODES, *Ecclesiastical* (*Toni Ecclesiastici*), or, *Tones of the Church.* In what is called the Gregorian Chant there are eight modes, or tones—four Authentic, and four *Plagal.* [AUTHENTIC; PLAGAL.] The Authentic modes are the Dorian, Phrygian, Lydian, and Mixo-Lydian of the antients, which correspond, according to Dr. Burney, to D and A minor, C and D major, of the moderns. These were chosen by St. Ambrose, about the year 370, for the church of Milan. The Plagal modes are the Hypo-Dorian, Hypo-Phrygian, Hypo-Lydian, and Hypo-mixo-Lydian, corresponding to G and A minor, F and G major, and were added by St. Gregory about 280 years after the adoption of the former. It must be observed, that the Gregorian Chant has its dominant, but takes this name from being the note most often heard; hence it is frequently mentioned in the Gregorian schools as the key-note.

MODILLION (Architecture), an ornamental member in the Corinthian cornice, resembling a small bracket placed horizontally, that is, with its back against the soffit of the part it supports, in which respect it differs from the console, which is placed upright, with its back against the vertical face of the part to which it is attached, and with its larger or convex end uppermost, whereas the larger end of the modillion is placed backwards, and its smaller one in front. Yet though they thus far differ both as to the mode and the purpose of applying them, and also as to their details, in general form the modillion and the console closely resemble each other, the face being composed of a curve of contrary flexure. Modillions are placed beneath the corona of the cornice, and although sometimes omitted out of parsimony, are indispensable to the character of the order, being quite as much distinguishing marks of its entablature as mutules are in the Doric and dentils in the Ionic cornice. They also admit of considerable variety, not only with respect to their design, but also their proportions. Some latitude also is allowed as to the distance at which they are placed from each other. The average or normal distance at which they are placed from each other is at intervals equal to twice their own breadth, but it is sometimes more, sometimes less, according to circumstances, and is in some measure regulated by the distance from the axis of one column to that of the next, because there ought to be a modillion immediately over each column, that is, in a line with the axis of it. This rule however is not very strictly adhered to because the modillions are seldom so large as to render any want of perfect regularity in that respect very apparent. In general the soffit or curved face of the modillions are ornamented with a leaf; sometimes, on the contrary, the whole modillion is very plain, or rather is converted into a block slightly ornamented on its face. Where great richness is desired, dentils are also introduced beneath the modillions, and separated from them by mouldings, as is the case in the Jupiter Stator example.

MODI'OLA. [MYTILIDÆ.]

MODULATION, in Music, is a changing of the key, or *mode*, during the progress of a composition. The word is derived from the Latin verb *modulor*, *to compose or sing in measure*, melody of some sort being inferred.

Though it is not quite clear what the antients meant by the term *modulatio*, yet the presumption is that they signified by it the rise and fall of the voice (*accentus*) and the measure of the syllables in recitation and declamation, altogether amounting to a kind of singing; and this we are inclined to think was the boundary, or nearly so, of their proficiency, and what they chiefly aimed at, in the vocal art.

In modern music, Modulation is a most important element, and in proportion to its importance would be the manner of treating it here, were our work a collection of treatises; but limited as we are in space, we must be confined to some general remarks, illustrating these by a few brief examples.

Modulation may be divided into Simple, Chromatic (or extraneous), and Enharmonic. Simple Modulation is a change from a given key to another nearly related to it, namely, its fifth, fourth, relative minor, or relative minor to its fifth; and this modulation, not to be abrupt, is effected by at least one intermediate chord, which must belong to the harmony of the key into which it is intended to pass. Examples in four parts:—

C to G. C to F.

C to A minor. C to E minor.

The close resemblance of the scales of G, F, A minor, and E minor, to the scale of C, renders the modulation easy and natural; hence we have termed it *simple*. And it must now be observed, that the natural major key is here chosen as the diverging point merely on account of its apparent simplicity; any other would have answered the purpose, provided the same relations had been preserved. Thus, for instance, from the key of E♭ to its fifth B♭, is relatively the same as from C to G. Example:—

Chromatic Modulation is the change from a given key to some other not analogous to it; *i. e.* to one differing much in scale, and, consequently, in signature. [SIGNATURE.] Examples:—

c to A ♭.

c to E. c to F minor.

Enharmonic Modulation is the change from a given key to another quite unanalogous, by means of an enharmonic interval,—that is, by the same interval binominously considered; as C and B♯, A♭ and G♯, &c. [ENHARMONIC.] Examples:—

c to c♯.

c to D♭ (from Kirnberger).

In these examples we have endeavoured to show the most direct method of modulating, and, except in one instance, by means the dominant 7th and the diminished 7th, or their inversions. By the intervention of a few additional chords, more elegant effects might have been produced, both as regards harmony and melody. But it must also be remarked that suddenness of transition is often essential to the design of the composer, in which case he takes the shortest road from key to key that the ear will permit.

It will be seen that we entirely differ from those who—perhaps misled by the word *modulatio*, and its interpretation by antient writers—think that modulation may be carried on without any change of key. We are decidedly of opinion, though in opposition to some highly respectable authorities, that *modulation* and *change of key* are identical terms.

MODULES (Architecture), from the Latin *modulus*, as being a lesser measure than the diameter of the column, is employed to signify one half of the latter, or thirty *minutes*. Some writers reckon entirely by *modules* and *minutes*. Thus instead of saying a column is eight or eight and a half diameters high, they would describe its height as being sixteen or seventeen modules.

MŒRIS, Lake. [EGYPT.]

MŒSIA, the name of a province of the Roman empire, extending north of the range of Mount Hæmus, the modern Balkan, as far as the Danube, and eastwards to the Euxine, and corresponding to the present provinces of Servia and Bulgaria. Its boundaries to the west were the rivers Drinus and Savus, which divided it from Pannonia and Illyricum. Strabo (vii. 295) says that the old inhabitants of the country were called Mysi, and were a tribe of Thracians, like their eastern neighbours the Getæ, with whom they have been confounded [GETÆ], and that they were the ancestors of the Mysi of Asia Minor. The Romans first invaded their country under Augustus (Dion, cap. 51), and it was afterwards made into a Roman province, and divided into Mœsia Superior, to the west, between the Drinus and the Œscus or modern Isker, and Mœsia Inferior, extending from the Œscus to the Euxine. Being a frontier province of the empire, it was strengthened by a line of stations and fortresses along the south bank of the Danube, of which the most important were Axiopolis, Durosteron, Nicopolis ad Istrum, Viminiacum, and Singidunum. In the interior of the country were the towns of Naissus (the modern Nissa), Sardica, Marcianopolis; and on the coast of the Euxine, Odessus or Odyssus, near the modern Varna, Dionysopolis, and Tomi, the place of Ovid's exile and death. A Roman wall was built from the Danube to the Euxine, from Axiopolis to Tomi, as a security against the incursions of the Scythians and Sarmatians, who inhabited the delta of the Danube.

The conquest of Dacia by Trajan removed the frontiers of the empire farther north, beyond Mœsia; but after the loss of that province, about A.D. 250, Mœsia became again a border province, and, as such, exposed to the irruption of the Goths, who, after several attempts, crossed the Danube and occupied Mœsia in the reign of the emperor Valens. The Mœso-Goths, for whom Ulphilas translated the Scriptures, were a branch of Goths settled in Mœsia. Some centuries later the Bulgarians and Sclavonians occupied the country of Mœsia, and formed the kingdoms of Bulgaria and Servia.

MOFFAT. [DUMFRIESSHIRE.]

MOGADORE. [MAROCCO.]

MOGUL EMPIRE is the name commonly given to the empire founded in Hindustan by the successors of Timur, in the sixteenth century. Baber, a descendant of Timur, and a prince of the Jaghatai Turki tribe, after conquering Samarcand, Bokhara, and Cabul, crossed the Indus, and invaded the Penjab. He marched upon Delhi, defeated and killed Sultan Ibrahim Lodi, the Afghan sovereign of Hindustan, took Agra, defeated Rana Sanka, a powerful Hindu prince, extended his conquests to the mouths of the Ganges, and established his Tatar dynasty over those vast regions, 1526-8. As he had many Mongols in his service, and as he was a successor of Timur Beg, who, though a Turki-Tatar himself, and not a Mongol, had re-united for a time the old Mongol empire of Gengis Khan, the dynasty established by Baber in India became known in Europe by the name of the Mogul empire, and the misnomer has perpetuated itself in history. [MONGOLS.]

Baber, after distinguishing himself as a great conqueror, became also a wise administrator, and applied himself to promote the prosperity of his vast dominions. [BABER.] He died in 1530, and was succeeded by his son Humâiûn, a mild and good prince, who however had not the abilities of his father. The Patans, a tribe of Afghans, rose against him, and forced him to emigrate, and a Patan dynasty was established at Delhi. Humâiûn however returned with a fresh force of Turcomans and other Tatars, and re-took Delhi. He died in 1556, and left an unsettled throne to his son Akbar, then a mere youth.

Akbar, by means of his generals, re-took Agra from the Afghans, re-conquered Malwa and Behar, defeated the Uzbek chiefs who had revolted, invaded and conquered Guzerat and Sinde, and consolidated the empire in the house of Timur. For an account of his life see AKBAR. Deviating from the old principle that all the land belonged to the crown, and that the occupiers were yearly tenants, Akbar alienated many lands in favour of the actual occupiers, to whom he gave by an edict the right of transferring their property without the necessity of obtaining permission from the crown.

Akbar died in 1605, and was succeeded by his son Jehangire, a good though rather weak prince, who followed his father's steps in his administration.

Jehangire died in 1627, and was succeeded by his son Sultan Kurram, who assumed the name of Shah Jehan. He was an able prince, who extended the limits of the empire south of the Nerbuddah, as far as the frontiers of Golconda and Vizapore.

Shah Jehan was deposed in 1658 by his third son Aurengzebe, whose long reign was the most brilliant period of the dynasty of Timur in India. For particulars see AURENGZEBE.

Aurengzebe died in 1707, and was succeeded by his son Bahadar Shah, who died in 1712, and was succeeded by his son Moaz ul Dien, styled Jehandar Shah, who reigned only eighteen months, and was succeeded by his nephew Firrocksere in 1713.

In 1717 Firrocksere was deposed, and deprived of his sight by two chiefs, Abdullah Khan and Hassan Khan, who raised to the throne Raffeih ul Dirjat, another grandson of Bahadar Shah, but put him to death after three months.

In 1718 Mahummud Shah, son of Jehandar Shah, ascended the throne, and having rid himself of the two rebellious chiefs, gave himself up to indolence and pleasure. In the meantime the Mahrattas had become extremely formidable, and the various khans, or governors of provinces, aspired to independent sovereignty. To crown Mahummud's misfortunes, Nadir Shah, the usurper of Persia, invaded Hindustan and entered Delhi. Mahummud surrendered to him, and was treated with some regard; but the exactions of Nadir's officers having occasioned an insurrection in the city, Nadir gave orders for a general massacre, in which many thousands, without distinction of age and sex, lost their lives, A.D. 1739. Nadir soon after returned to Persia with large plunder, leaving Mahummud on the throne, who formally ceded to him all the provinces north-west of the Indus. The governor of the Deccan, Nizam ul Muluk, usurped the sovereignty of that province, and an adventurer, Aliverdi Khan, likewise usurped Bengal. Mahummud Shah died in 1747, and was succeeded by his son Ahmed Shah.

The reign of Ahmed Shah was still more disturbed than that of his father, by invasions of the Mahrattas, Rohillas, Patans, and other predatory bands, and by the ambition of the various chiefs, or governors of provinces. Ghazi ul Dien, the eldest son of the Nizam ul Muluk, being disappointed of his father's inheritance by his brothers, after several attempts to recover it, died of poison, leaving a son, young Ghazi, who held an office of trust at Delhi under the emperor. He was a brave youth, and fought courageously for his master against various rebels; but Ahmed Shah, becoming jealous, endeavoured to get rid of him. Ghazi, discovering this, marched upon Delhi, took it, and deposed Ahmed Shah, who was at the same time deprived of his sight, in the year 1753. Ghazi then placed on the throne another prince of the blood, who assumed the name of Allumghir, while Ghazi, in fact, ruled the empire with the title of vizier.

Achmet Abdallah, of Herat, who, in the midst of the confusion into which the affairs of Persia had fallen after the death of Nadir Shah, had formed a new empire in Afghanistan, invaded the Penjab, took Lahore, and advanced towards Delhi, A.D. 1757. Ghazi went out to meet him, but was forsaken by part of his troops in consequence of secret orders from Allumghir, who was jealous of the authority of his vizier. Ghazi surrendered to Abdallah, whose favour he won; and when Abdallah left Delhi to return to the north, he left Allumghir as the nominal possessor of the throne, under the control of the vizier. In 1759 Abdallah again advanced into Hindustan, encouraged by Allumghir, who kept a correspondence with him, which being discovered by Ghazi, the latter caused the emperor to be assassinated. He then placed on the throne another prince of the blood, named Shah Jehan. Ghazi was obliged to submit to Abdallah, who entered Delhi, and raised enormous contributions, in consequence of which a revolt having broken out among the inhabitants, a general massacre ensued, and a great part of the town was destroyed by fire, A.D. 1761. Then came a new invasion of the Mahrattas, who entered Delhi after Abdallah's departure, obliged the vizier to escape, deposed Shah Jehan, and raised another puppet prince to the throne. Meantime Shah Allum II., the son of Allumghir, had himself proclaimed emperor at Patna, under the protection of the Soubadhar of Bengal, Suraja al Dowlat. The Soubadhar being defeated by the British forces, Shah Allum came into the hands of the latter, who gave him the town of Allahabad, and part of that province, for his subsistence. After numerous subsequent vicissitudes, Shah Allum died in 1806, a pensioner of England; and with him the empire of the house of Timur, commonly known as the Mogul Empire, may be considered as having terminated, and the British East India Company, after half a century of wars and conquests, succeeded to its splendid inheritance. [HINDUSTAN.]

(Dow, *History of Hindustan, to the death of Akbar, translated from the Persian, with an Appendix, containing the History of the Mogul Empire, from its decline in the reign of Mohammed Shah, to the present time*, London, 1768, Dow, *History of Hindustan, from the death of Akbar to the complete settlement of the Empire under Aurungzebe, with an Inquiry on the State of Bengal*, London, 1772. See also a *Chronological Account of the Connection between England and India*, in the *Companion to the Almanac* for 1832, published under the superintendence of the Society for the Diffusion of Useful Knowledge.)

MOGULBUNDI. [HINDUSTAN, p. 210.]

MOHAMMED, ABUL KASEM IBN ABDOLLAH, was born at Mecca, on the 10th of November, 570, or, according to other authorities, on the 21st of April, 571. His father Abdollah, whose only son he was, belonged to the family of Hashem, the most distinguished branch of the noble tribe of Koreish, which claimed a direct descent from Ismael, the reputed progenitor of the Arabian race, and had acquired a decided superiority over the surrounding tribes. Owing to an active and uninterrupted commerce, the Koreishites were not only renowned for their opulence and refinement, but, being concentrated about the antient place of the common Arabian worship, they were the hereditary guardians of the celebrated Caaba, the custody of which, together with the sacerdotal office, had for a long time been the privilege of the Hashemites, the ancestors of Mohammed. Mohammedan authors have laboured to adorn the birth of their prophet with many miraculous events, such as the Persian sacred fire being suddenly extinguished, and a splendid light having spread over all Arabia; but these and similar embellishments of his life, with a great number of prodigies attributed to him, we may leave to the credulity of his enthusiastic followers. In his early childhood Mohammed lost both his parents; his mother Amina died in his second year, and the child was committed to the care of his aged grandfather Abdol Motaleb, who was then the chief priest of the Caaba. Abdol Motaleb was succeeded by Abu Taleb, the uncle of Mohammed, who now became his guardian, and with whom he made several journeys and mercantile adventures, principally towards Syria, and to the fairs of Damascus, Bagdad, and Basra. In his twentieth year Mohammed took part in an expedition against the predatory tribes which then molested the caravans and pilgrims on their way to Mecca. This wandering kind of life and the practice of warfare animated the youth with an eager desire of adventure and military achievements, and with that spirit of chivalry which may be considered as the germ of his future exertions. To this must be added a strongly marked propensity to solitary retirement and to religious abstraction, originating probably in his early contemplation of the absurd ceremonies and cruel idolatry of his contemporaries which he witnessed at Mecca, and in which he had been compelled to take part by replacing the famous black stone in the wall of the Caaba when the temple happened to be repaired.

A Nestorian monk, the abbot of a monastery at Basra, named Boheira, was the first who observed and appreciated the character of young Mohammed. After having conversed with him on religious subjects, he foretold to his uncle Abu Taleb that great expectations might be conceived of the boy provided he should escape the snares of persecuting Jews, a caution which will be explained in the course of this narrative.

In the twenty-fifth year of his age Mohammed became acquainted with a rich widow Khadija, whom he subsequently married; and during the fifteen following years little more is known of him than that preparatory to his intended mission he frequently retired to the cave of Hevà, in the neighbouring mountains, and also made a second journey into Syria and occasional visits to the southern parts of Arabia. During these journeys he gained information at such times

and in such degree as circumstances permitted, and he is said to have conversed most familiarly with some learned Jews and Christians, among whom are particularly mentioned a celebrated rabbi, Abdollah Ibn Salaam, and Waraka, the nephew of his wife, who first deserting his native polytheism, and afterwards the Jewish faith, had embraced the Christian religion, and was well acquainted with the Old and New Testament. (Abulfeda, *Annales*, i., 283; Marraccius, *Prodromus* 1, 44.)

In the fortieth year of his age Mohammed assumed the prophetic office, and displayed his views and principles to his own domestic circle. His first efforts were successful, for his wife Khadija, Waraka, Abubeker, his cousin-german Ali ben Abi Taleb, and several other members of the family, readily acknowledged his divine mission, and himself as the apostle of Allah.

After being three years silently employed in the conversion of his nearest friends, he invited the most illustrious men of the family of Hashem to his house, and after having conjured them to leave idolatry for the worship of one God, he publicly proclaimed his calling, and declared that by the command of that one God, revealed to him by the angel Gabriel, he felt compelled to impart to his countrymen the most precious gift, and the only means of their future salvation. Far from being persuaded, the assembly was struck silent with surprise mingled with contempt. The young and enthusiastic Ali alone, throwing himself at the feet of Mohammed, with a solemn vow offered to be his companion, but his father, the mild and sober Abu Taleb, seriously advised the prophet to abstain from his strange and fanatical design. Mohammed replied, that even if the sun should be placed on his right hand and the moon on his left, they should never divert him from his career. Stimulated rather than intimidated by the resistance of his relations, the reformer soon began to frequent the public places of Mecca, and openly to preach the unity of God, calling upon the citizens to repent of their idolatry, exhorting them to devote themselves to the service of a supreme and most merciful Being, and reciting fragments of the Korân or affixing them at the doors of the Caaba. It is reported that he had the honour of thus converting the celebrated poet Lebid, who, struck with the sublime beauty of a passage thus promulgated, declared it far superior to any production of human genius, and willingly joined in the profession of Islam. The people listened to the precepts of the moralist, and though they were enraptured by the force of his eloquence, very few were yet inclined to desert their hereditary and long-cherished ceremonies, and to adopt a spiritual faith the internal evidence of which they were unable to comprehend. Mohammed was repeatedly urged by them to confirm his divine mission by miracles, but he wisely appealed to the internal truth of his doctrine, and expressly declared that wonders and signs would depreciate the merit of faith and aggravate the guilt of infidelity. The only miraculous act which Mohammed professed to have accomplished, and which has been greatly exaggerated by his credulous adherents, is a nocturnal journey from the temple of Mecca to Jerusalem, and thence through the heavens, which he pretended to have performed on an imaginary animal like an ass, called Borak (lightning); but we need scarcely remark that the simple words of the Korân (*Sur.* xvii.) may as well be taken in the allegorical sense of a vision.

In the meantime several of the noblest citizens, such as Abu Obeida, Hamza, an uncle of Mohammed, Othman, and the stern and inflexible Omar, were successively gained by the moderation and influence of Abubeker, with whom, by marrying his only daughter Ayesha, the prophet had become more nearly allied after the death of his wife Khadija. Nevertheless for more than ten years the new faith made little progress within the walls of Mecca, and might have been extinguished in its birth, if the jealous leaders of the Koreishites had not directed their animosity and violence against the whole line of Hashem. Although menaces and persecution, too often repeated to be minutely related here, had compelled the few votaries of Mohammed to retire into Abyssinia, the spirit of party continually kindled the flame of dissension. At last a revolt, which threatened the life of Mohammed, broke out at Mecca, and the prophet took his flight to Yatreb, afterwards known by the name of Medina (Medinat-al-nabi), or the city of the prophet. This retreat happened on the 16th of July, 622, and has been adopted as the Mohammedan æra, called Hejra. The citizens of Medina, among whom the seeds of Islam had been sown by some converted pilgrims returning from Mecca, were readily inclined to embrace the cause of the reformer, whom they had often invited by several previous deputations, and to whom they had promised their alliance and protection against his enemies. Accordingly they advanced in procession to meet the banished prophet, invested him with the regal and sacerdotal office, and offered their assistance in propagating by force the tenets of his new religion. From this moment a vast theatre opened to the enthusiasm and ambition of Mohammed. His revelations assumed a much higher claim; he inculcated as a matter of religion and of faith the waging of war against the infidels; and the sword once drawn at the command of Heaven from that time remained unsheathed until the tribes of all Arabia and the adjacent countries had joined in the profession that there is no God but Allah, and that Mohammed is his apostle.

After various enterprises and petty excursions, three great battles were fought with the Koreishites under Abu Sophian, the most implacable foe of Mohammed and of the Hashemitic line, who, after the death of Abu Taleb, had succeeded to the principality of Mecca. A military force of nearly a thousand men had been collected by Abu Sophian, in order to protect a wealthy caravan on its way to Syria, and to attack the daring band of the prophet, who, with only three hundred warriors, awaited them in the valley of Beder, twenty miles from Medina. The Moslems, inflamed with enthusiasm and expectation of booty, furiously assailed the enemy, who, after a short battle were totally defeated and dispersed, leaving a rich spoil to the conquerors. To avenge this disgraceful defeat Abu Sophian advanced in the following year (Hejr. 3) with an army of three thousand men towards Medina, and a bloody action, in which Mohammed was severely wounded, took place near Mount Ohud. The Koreishites were now victorious, but the Moslems soon rallied in the field, and a third war, during which the city of Medina was besieged for twenty days, was terminated by a single combat of the valourous Ali. Surrounded by a number of roving clans secretly favouring the new cause, or at least of a doubtful disposition, the idolaters either wanted strength or courage to protract hostilities, and accordingly an armistice of ten years was agreed upon by both parties. This interval Mohammed employed in converting or subduing the principal Jewish tribes, namely, those of Kainokâo, Koraidha, Nadhir, and Chaibar. (Abulfeda, *Vita Moham.*, p. 67; Pococke, *Specimen Hist. Arabum*, p. 11.)

The castles and towns of the unwarlike Jews were rapidly taken and plundered, and the unhappy people, being unwilling to embrace the religion of the conqueror, were driven out, or persecuted and slaughtered with the utmost cruelty. But the prophet paid dearly for this, as he never entirely recovered from the effects of poison prepared for him by a Jewish female of Chaibar. Thus advancing among the tribes of his native country, the power of the fierce and ambitious apostle increased like an avalanche, and as the Koreishites had been guilty of violating the truce, he proceeded at the head of ten thousand warriors towards Mecca (Hejr. 8). The town surrendered without resistance, and yielding to the victorious banners of Islam, the people unanimously hailed, as the sovereign of Mecca, the prophet whom they had driven from his paternal hearth. Mohammed readily forgave his converted brethren the insults which he had formerly received from them, and after having broken the three hundred and sixty idols round the Caaba, and destroyed every vestige of idolatry, he adorned and consecrated the temple to the worship of God. In doing this he himself set an example of the most earnest prayer and devotion, and strictly fulfilled the religious duties and ceremonies which the pilgrims to the holy shrine had theretofore invariably observed. The conquest of Mecca, and a subsequent prosperous expedition against the hostile fortress of Tayef, were speedily followed by the submission of the idolatrous tribes over all Arabia, and even the petty chiefs of the neighbouring provinces presented gifts or offered their friendship and alliance to the victorious prophet. Intoxicated with ambitious pride, Mohammed now despatched his ambassadors to Khosru Parviz, king of Persia, to Heraclius of Byzantium, and to the king of Abyssinia, solemnly inviting them to the profession of Islam, or threatening them with war. Accordingly an army of three thousand Moslems invaded the eastern territories of Palestine, and although this and a subsequent expedition to the west were only momentary excursions, a number of foreign tribes

and cities willingly submitted. This arose principally from the clemency and moderation of the prophet towards the Christians, from whom he claimed only a moderate tribute, and to whom he most liberally granted his protection, security and freedom of trade, and toleration of their worship, and whose conversion to his religion he rather expected than enforced. On this occasion a patent in favour of his Christian subjects, known under the name of 'Testamentum Mohammedis,' was formally published, which, whatever may be thought of its authenticity, is at least in accordance with many passages of the Korân, declaring that 'no force shall be employed in religion; that the prophet is nothing but a teacher and admonisher of the people, who shall not be governed by violence, and that the believers shall leave those who do not believe to the punishment of God, for He is the only arbiter, and will reward every one as he deserves.' (*Sur.* ii., 257; xlv., 14; lxxxviii., 21, &c.) Returning from these military expeditions, and having once more accomplished a solemn pilgrimage to the temple of Mecca, Mohammed retired to Medina, where, to the great consternation of his followers, he died. This event happened, after a severe fever of fourteen days, on the 8th of June, 632, in the sixty-third year of his age. Omar, with many enthusiastic disciples, firmly believed that a prophet could never die; and it required all the authority of the sober and prudent Abubeker to refute so absurd an opinion. 'Is it Mohammed,' he exclaimed to the frantic multitude, 'or the God of Mohammed, whom you worship? The God of Mohammed liveth for ever, but the apostle was a mortal like ourselves, and has experienced the common fate of mortality.'

Having thus rapidly sketched the political life of the Arabian prophet, by whose noble aspirations and intrepid courage the hostile tribes of an immense country were for the first time united in faith and obedience; and before discussing the principles of a religion, which, during the space of a century, displayed its victorious banners over all Arabia, Syria, Asia Minor, Persia, Egypt, and the coasts of Africa, and whose precepts even now are zealously followed from the Ganges to the Atlantic by more than a hundred and twenty millions of people—we feel it necessary to take a short retrospective view of the state of Arabia previous to the introduction of Islam. The aboriginal inhabitants of the peninsula had, from time immemorial, been divided into a great number of free and wandering clans, limited communities, and petty states, whose peculiarities of character, mode of life, and political institutions, as they were mostly dependent upon local circumstances, were for centuries stamped with the same unaltered features, and had been preserved almost unchanged even from the time of the Patriarchs in the book of Genesis. The mountainous table-land of central Arabia, abounding in rich pasturage and fertile valleys, but at the same time intersected and skirted with dreary wastes and sandy plains, was occupied by those roving tribes who, in opposition to the settled inhabitants, are proud of the name of Beduins, or people of the plain. Most of them were addicted to a wandering pastoral life, but from being strongly disposed to war and chivalrous adventures, their peaceable occupations were interrupted, either by conducting a caravan of merchants, or still oftener by assailing and robbing their fellow-tribes. Every tribe was governed by the most aged or worthy Sheikh of that family which had been exalted above its brethren by fortune and heroic deeds, or even by eloquence and poetry. For as the heroic bards were at once the historians and moralists, by whom the vices and virtues of their countrymen were impartially censured or praised, a noble enthusiasm for poetry animated those Arabs, and at an annual fair at Okhad, thirty days were consecrated to poetical emulation, after which the successful poem was written in letters of gold and suspended in the temple of Mecca. Those meetings however formed only a very feeble bond of union among the independent and hostile tribes, who only occasionally, and in times of danger and warfare, submitted to a supreme chief, or Emir of Emirs, and had never yet been united into one body. And the tie was still less binding on those inhabitants who, being collected in flourishing towns and cities on the coasts of the peninsula, and mostly employed in trade and agriculture, were regarded with supreme contempt by the free Beduins, as a weak and degenerate race of slaves. The religious worship of the Arabs chiefly consisted in the adoration of the heavenly luminaries, which were considered as so many tutelar deities of the different tribes; and among which, after the sun and moon, the planet Venus had acquired such peculiar pre-eminence, that even to the pious Moslems Friday ever after remained the sacred day of the week. These deities, with many other images of the personified powers of nature, rudely represented by idols of every variety of shape, were principally gathered round the antient Caaba, or square temple, the Pantheon of Arabian idolatry at Mecca; and their worship was accompanied, not only with the most horrid rites and shocking ceremonies of a degraded paganism, but even with human sacrifices and cruelties of every description. Even children were immolated by some of the ruder clans to the idols; while others, as the Kendites, buried their daughters alive (*Sur.* vi., 137; xvi., 58; lxxxi., 8), and we need scarcely remark, that, except a vague belief of the soul becoming transformed into owls hovering round the grave, there is no indication that the Arabian idolaters believed in a future life and final retribution. (Pococke, *Specimen Historiæ Arabum*, ed. White, 1806.) Among the foreign settlers in Arabia, we pass over in silence the few adherents of Zoroaster, scattered along the Persian gulf, and the Sabæans, on the southern coast of the peninsula, who, even from the time of David and Solomon, stored their rich emporiums of Ophir, Saba, and afterwards Aden, with Indian merchandise, and who, as is clear from many good arguments, were undoubtedly of Hindu origin. The Christian religion had long been established in several parts of Arabia, but the Christianity of the Oriental church, at that time, almost resembled paganism, being associated with monachism and with the worship of martyrs, relics, and images. Among the heretical sectaries, who, absorbed in their monophysitical and other abstruse dogmatical controversies, looked upon each other with the utmost hatred, we find particularly mentioned the Nestorians, Jacobites, Marcionites, and Manichæans, besides some other obscure sects, such as the Collyridians, who, deifying the mother of Christ, and adoring her as the third person in the Trinity, probably gave rise to the Christian tritheism so often dwelt on by the author of the Korân. After the destruction of Jerusalem, the Jews had retired in great numbers to Arabia, where, owing to the loose connection and the jealousy of the aboriginal tribes, they had gained considerable power. Many of them, adopting the fierce manners of the desert, chose a wandering life, connected with all its dangers and adventurous strife, and a poem composed by a Jewish Beduin has been preserved in the Hammâsa, which breathes the true spirit of Arabian chivalry. (*Hammâsa*, p. 49, Freyt.) But in general the Jews were peacefully settled in towns and fortified castles, principally along the coast, or dispersed among the inhabitants of large cities. It was to the Jews of his country that the Arabian reformer first and most eagerly looked for proselytes, and his early predilection in favour of the *possessors of Scripture*, as they are honourably called, might be attested by innumerable passages of the Korân. He not only appeals frequently to their testimony in order to verify the revelations of former times, and consequently the truth of his own divine mission (*Sur.* ii., 134; x., 93; xxvii., 77; xxxii., 25; xlv., 16), but to gratify the Jewish superstition, he even instructed his first disciples to direct their prayers towards the holy shrine of Jerusalem, which was afterwards altered in favour of the Caaba. (*Sur.* ii., 143-146.) But the followers of the Mosaic institution, being then already entangled in their fanciful Talmudic lore, were by no means inclined to accept the more simple and less alluring tenets of Islam, and when the most persuasive summons of the prophet were repeatedly answered by ironical sneers and undisguised contempt, his former friendship was converted into implacable hatred, and the Jews were accordingly stigmatised as the enemies of the Moslems, the murderers of their prophets, as interpolators of sacred Scripture, and, in pretending to be the chosen people of God, as the haughty foes of mankind. (*Sur.* ii., 58, 73; v., 21, 74, 85.)

Nevertheless it is to his Jewish instructors, and particularly to the above-mentioned rabbi, Abdollah Ibn Salaam, that Mohammed was indebted for that ample knowledge of biblical history, and for all those dogmatical legends, fanciful ornaments, and absurd interpretations of Scripture, with which almost every page of his Korân is stamped. (A. Geiger, *Was hat Mohammed aus dem Judenthume aufgenommen?* Bonn, 1833.) This leads us to that singular work, which, from the importance of its contents, has been acknowledged as the fundamental code of civil and criminal

law for many millions of mankind; a work which, from the force and sublimity of its style, has been for centuries admired, and has become the model and standard of all Arabic writers, and whose language is even now the vehicle of communication for nations between the Polynesian isles and the Columns of Hercules; a work which is considered by all these nations as the inexhaustible source of their happiness on earth, and as the only means of their eternal bliss and salvation hereafter; a work which, according to pious Moslems, was written before the throne of God with a pen of light on the table of his everlasting decrees, and of which a mere copy was brought down and revealed to Mohammed by the angel Gabriel.

The Korân (*lecture*), or with the Arabic article, Alkorân, commonly called the book, or book of Allah, both in imitation of the rabbinical denominations of the Scripture, namely, Mikra and Khitab, is a collection of all those various fragments which the prophet, during the time of his apostolic office, successively promulgated as so many revelations from heaven. It would be almost impossible to characterise the leading features of the Korân, or even to give a full and clear account of its contents; for the chronological order of the incoherent rhapsodies has been neglected, and we are at a loss either to trace any logical connection between them, or to reconcile the many glaring contradictions in a work which otherwise might have served as an official journal of the progress of Islam. According to the momentary feelings of the prophet, his frame of mind, or the mere suggestions of his fancy, pious meditations and fervent prayers are suddenly interrupted by hortatory speeches and admonitory discourses. Apostrophes of Allah to the listening apostle, and of course to the refractory unbelievers, are interrupted by legendary tales and fabulous traditions of antient Arabic heroes and tribes; and religious customs and ceremonies, enforced with moral sentences and the most energetic recommendations of gratitude, charity, patience, and piety, are occasionally illustrated or strengthened by the examples of the biblical patriarchs and prophets derived from rabbinical authority. Add to this the purity of the language, which is the most refined dialect of Hejaz, and the harmony and copiousness of the style, which in splendid imagery, bold metaphors, and occasional rhyme, rather resembles poetry than prose, and, though sometimes obscure or verging upon tumidity, is generally vigorous and sublime,—and we may readily acquiesce in the judgement of Goethe, that the Korân is a work with whose dulness the reader is at first disgusted, but is afterwards attracted by its charms, and finally ravished irresistibly by its many beauties. The revelations of the Korân had been originally preserved by oral tradition, or handed about in fragments, written on palm-leaves and pieces of parchment by the slave of Mohammed, Said ben Thabet. The scattered leaves were collected into a volume by Abubeker, two years after the death of the prophet; but many apocryphal additions having crept into the collection, an authentic copy was afterwards revised and sanctioned by the Caliph Omar (652). The code is divided into 114 chapters, or *suras*, which are inscribed with the name of Mecca or Medina, where they had been promulgated, and with the number of verses which they contain; but they are mostly arranged according to their length, and without any regard to chronology, the seventy-fourth and ninety-sixth chapters being supposed to have been the first revealed. Among the numerous illustrations of the Korân we may notice the celebrated commentaries of Abul Kasem Mohammed Al-Samachshari, and Nazireddin Al-Beidhavi (in the twelfth and thirteenth centuries), both of whom have endeavoured to reconcile the many discrepancies and contradictions of the work, and to explain its occasional obscurity, mostly by means of that recognised oral tradition which, recording in more than 7000 anecdotes the private life, opinions, discourses, and sentences of the prophet, had been collected by Abu Abdollah Mohammed Al Bochâri in the ninth century. This collection, combined with a previous controversy respecting the exclusive right of Ali or of Abubeker and the two following caliphs to the supreme pontificate and secular sovereignty over the Moslems, gave rise to the great division of the whole Mohammedan community into Shiites, or sectarians, by whom the authority of tradition is rejected, and Sunnites, or orthodox believers. [ABBASIDES.] The first printed edition of the Korân, by Pagninus Brixiensis (Rome, 1530), was burnt by order of the pope; and that of Lud. Marraccius was not allowed to appear unless attended with a *Prodromus ad Refutationem Alcorani*, Padua, 1698, folio. A quarto edition of the text by Abr. Hinkelmann (Hamb., 1694) has been critically revised and reprinted by G. Fluegel (Leipz., 1834). A French version by Savary (1783), carefully corrected by Garcin de Tassy, appeared in 1825. The English translation by G. Sale, accompanied with a learned Preliminary Discourse and Notes, was first published in 1734, and has been often reprinted.

The religious system of Mohammed, designated by the name of Islam, or salvation, is displayed throughout the Korân in single and often-repeated precepts. It consists of two parts; of a dogmatical (or Imân) faith, and a practical (or Dîn) religion. The principal articles of belief are the following:—There is but one God, eternal, omnipotent, most wise, and most merciful, to whom alone obedience and adoration are due, and whose majesty is daily proclaimed by a host of angels above, as well as by his own works around us; he is the author, preserver, and governor of the universe, and the supreme ruler of fate, by whose divine providence and absolute predestination the destinies of mankind have from eternity been decreed. The will of God and his divine law were often and fully declared by the former prophets, Adam, Noah, Abraham, Moses, and Christ, whose authority and station rise in just gradation above each other; but among whom Abraham is the chief prototype of a true believer. 'The patriarch was neither a Jew nor a Christian, for he believed in the unity of God: he was a religious Moslem, and the friend of God, as the Islam is nothing more than the faith of Abraham.' (*Sur.* ii., 134; xvi., 120.) Nor is Isaac to be considered as the beloved son of the patriarch; for it was Ismael, the pious father of the Arabian race, whom God asked for a sacrifice (xix., 55; xxi., 85; xxxvii., 101); and it may be worth remarking that the enthusiastic author of the Korân is often so totally absorbed by his thoughts, and the truth of his assertions so deeply worked on his mind, as to identify his own feelings with those of the biblical characters. Equal veneration and deferential respect are paid to our Saviour: 'Verily, Christ Jesus, the son of Mary, is the apostle of God, and his word, which he conveyed unto Mary, and a spirit proceeding from him, honourable in this world and in the world to come; and one of those who approach near to the presence of God. Yet Jesus was a mere mortal, and not the son of God; his enemies conspired against his life, but a phantom was substituted for him on the cross, while he was translated to heaven' (iii. 54; iv. 156, 159). But, after all, Mohammed is the last and by far the most illustrious apostle; with him, who is the seal of the prophets (xxiii., 40), the divine missions have ceased; and as the Scripture and Gospels have been altered by superstitious Jews and idolatrous Christians, the Korân must be revered as the only genuine revelation by which former religions are corroborated and verified (ii., 89; xlvi., 11). The soul of man is immortal, and at the day of resurrection and the final judgment of mankind every one shall receive the just reward of his virtues, or the punishment due to his evil deeds. Sinners, and particularly unbelievers and idolaters, shall be hurled about in a dark or burning hell; whereas the virtuous and pious Moslems shall be rewarded with everlasting happiness in a paradise, enlivened by heavenly virgins, and abounding with shady groves, clear streams of water, and delicious fruits—the most desirable enjoyments in the sandy deserts of Arabia. But the hope of salvation is not confined to the Moslem, for every man who believes in God and does good works shall be saved.

Besides the most weighty obligation to promote the propagation of Islam, which we have already noticed as incumbent on every Moslem, the first practical duties are, prayers directed towards the temple of Mecca at five appointed hours of the day, fasting during the month of Ramadhan, and alms, to which the fortieth part of a person's property must be appropriated, and which must be bestowed even on foes and on the brute creation. Prayer will carry the Moslem half way to God; fasting will bring him to the door of his palace; but charity and benevolence towards his fellow-creatures, by which the Supreme Being is best worshipped, will gain him admittance. Cleanliness of body and frequent religious ablutions are strongly recommended, and likewise attendance at divine service in the mosques on every Friday; and once in the course of a man's life, if possible, the performance of a holy pilgrimage to the temple of Mecca, the sacred birth-place of Islam. The antient

Arabian custom of circumcision, generally practised in the eighth year, the legislator retained; and in many usages and ceremonies he indulged the prejudices of his countrymen, either by connecting a prevalent superstition with the morals of a purer faith, or by restricting an abusive practice within its just limits. For example, instead of the former polygamy, four wives at most were legally allowed, and the matrimonial rules were more strictly regulated. The Korân enumerates as deadly sins, wilful murder, adultery, calumny, perjury, and false testimony. Usury, gaming, and the use of wine and pork, are strongly forbidden; and it is but doing justice to Mohammed to observe, that every precept enjoined upon his followers had been fully confirmed by his own example, if we except his incontinence with the sex. The prophet married no less than seventeen wives, strangely enough all widows, except Ayesha, the daughter of Abubeker. This sensuality, almost the only stain on his character, can neither be palliated by the natural temperament of the Arabs nor by his hope of posterity and lineal succession, which nevertheless failed, as the four sons of Mohammed died in their infancy. But we hardly need to apologise for the infirmities of a great man (and a great man Mohammed certainly was), who in every respect is described as a perfect model of Arabian virtue, brave and liberal, eloquent and vigorous, noble and simple in all his dealings, and of irreproachable morals. That fraud, cruelty, and injustice were often subservient to the first propagation of Islam, cannot be denied; but a religious enthusiast is compelled to act according to the overpowering suggestions of his imagination, which he easily persuades himself to be the inspirations of Heaven, and according to his own conviction of the importance and justice of his mission. As to this, the prophet repeatedly and in the strongest terms expresses his purpose of uniting and reconciling the hostile tribes of his country by destroying their gross idolatry, and by bestowing on them the most salutary and precious gift of a purer creed, in whose truth and divine origin he himself firmly believed. And indeed it will readily be admitted that the religion of the Korân, by which prayers and alms were substituted for the blood of human victims, and which, instead of hostility and perpetual feuds, breathed a spirit of benevolence and social virtues, has been a real blessing to the Eastern world, and has had a most important influence on its civilization. It is not merely to the conquering sword and to the intrepid courage of the reformer and his successors, but also to the intrinsic merits and attractive features of a system, rich with all the luxuriance of Eastern poetry, and most congenial to an ignorant and sensual generation, that the rapid progress of the Arabian conquests must be attributed, although favoured and promoted by the discord, internal revolutions, and weakness of the neighbouring governments.

(Arabia, p. 216; and for the further development of Islam, see Adr. Reland, *De Religione Mohammedica*, Utrecht, 1717.)

MOHAMUDGARA. [Sanscrit Literature.]

MOHAWK, River. [New York.]

MOHAWKS. [Iroquois.]

MOHILEW, or MOGILEW, a government of European Russia (in the division called West Russia), lies between 53° 5′ and 55° 10′ N. lat. and 28° 50′ and 32° 40′ E. long. It is bounded on the north by Vitepsk, on the north-east by Smolensk, on the south-east and south by Tschernigow, and on the west by Minsk. The area is 19,300 square miles, and it is divided into twelve circles. It is part of the flat tract of Russia, and contains no mountains, but only hills and the high banks of the rivers. It has fewer lakes, marshes, and low fens than some of the adjoining provinces, for instance, Vitepsk; the soil is not so sandy, and on the whole more productive. The principal river is the Dnieper, which comes from Smolensk and flows first west and then due south. It receives on the left the Swinaja, the Bolotimka, and the Sodscha, which last comes from Smolensk and receives several small rivers; on the right the Dnieper is joined by the Druez and the Beresina, of which latter only the mouth is in this province. Most of the lakes are in the north-west part; there are the Dolgoe, the largest of all, and the Sennoje; the others resemble large ponds.

The climate is drier and milder than in Vitepsk; and apples and pears, which there thrive only in sheltered spots, succeed here without any particular care.

The chief occupations of the inhabitants are agriculture and the breeding of cattle. The soil is equally favourable to both, and if the higher lands produce the finest corn, the low grounds on the banks of the rivers have the most nutritious pastures; but both these branches of rural economy are in a very backward state. Bad harvests sometimes occur, chiefly in consequence of careless cultivation, or of unfavourable seasons, but a general failure of the crops is rare. Rye is the principal bread corn; wheat is grown only on the estates of the nobility. Barley and oats are raised everywhere, and buckwheat in the most sandy soils, where no other kind of grain will grow; it is used in the form of groats, mixed with flour, and the poultry, especially turkeys, are fed with it. Hemp and flax are staple articles and cultivated for exportation. Peas and beans are cultivated almost exclusively on the lands of the nobles. Almost all the landowners have kitchen-gardens and orchards; in the latter all kinds of fruit are cultivated, chiefly however apples and cherries. Hops and poppies are grown in the gardens. The fescue grass (*festuca fluitans*, Linn.), here called manna, is found in the fields and in some parts gathered.* In the forests and low grounds there are prodigious quantities of bilberries. The forests are a great source of wealth to the province; in particular the banks of the Sodscha and the Druez, and the whole circle of Tscherikow, are covered with the finest firs, which are partly felled for the Black Sea fleet, and floated down the Dnieper. The crown forests are however of inconsiderable extent. The pastures are very good, and might maintain a much larger number of cattle than they now do. The horses are small; and the black cattle are not strong, but soon grow fat on good pasture. The wool of the sheep is coarse, but great pains have been taken of late years to improve it by the importation of a foreign breed. Deer and other large game are rather scarce; hares and feathered game of all kinds abound. The fisheries are productive; the Dnieper and Sodscha yield annually above 40,000 poods (a pood is 36 lbs.) of sturgeon and shad, the whole of which is consumed in the province. The chief mineral is bog-iron, which might be a source of great profit, but is not turned to much account. The manufactories are inconsiderable, and a few years ago were confined to some tanneries, glass and iron works, and paper-mills. Of late years, that is, since 1820, great improvement has been made. The trade consists in the exportation of corn, flour, flax, hemp, linseed, timber, cattle, honey, wax, wool, tallow, hides, and some manufactures. The principal trading towns are Mohilew and Mstislawl. The inhabitants, now probably amounting to nearly a million, are for the most part Russniaks or Little Russians, who speak a dialect which is a mixture of Polish and Russian; Great Russians; some Poles, to which nation most of the nobles belong, and Jews, who are pretty numerous. The religion of the majority of the inhabitants is that of the Russian (or not-united) Greek church. Some are of the United Greek church; but Brömsen says (in 1819) that most of them had returned to the not-united Greek church. The Greek churches have an archbishop, to whose diocese Vitepsk also belongs, and who resides at Mohilew; the Roman Catholics are also numerous, and have an archbishop resident at Mohilew. There are a few Lutherans; the Jews are very numerous; they have synagogues and schools in almost all the towns, and have got into their hands almost all the retail business, the sale of brandy, and some of the trades or professions. Gipsies are numerous.

Mohilew, the capital of the province, is a considerable town, situated in 53° 50′ N. lat. and 30° 25′ E. long., in a pleasant well-cultivated country on the left bank of the Dnieper. It is the residence of the civil and military governors, and of the Greek and the Roman Catholic archbishops. The latter is the superior of all the Roman Catholics in Russia and Poland. The city is surrounded with a decayed rampart, and is divided into four quarters. Many of the streets are broad and paved, and in the centre of the city there is a large square, or rather octagon, surrounded with stone buildings. The public edifices are, an old castle on a hill which commands the town; sixteen Greek churches, of which that of St. Joseph is very magnificent; the two archbishops' palaces; two Greek and two Roman Catholic convents; two synagogues; a Lutheran chapel; and a stone

* This species of grass grows in marshes, ditches, on the banks of rivers, and in low damp meadows, and in general grows highest in proportion as it is most under water. The seed is extremely nutritious, and is known by the name of manna groats. In Poland it is even preferred to rice, and so well prepared, that it is exported to Sweden, Prussia, Denmark, Norway, &c. The water-fowl and trout are very fond of the seed. The grass is good nourishment for all kinds of cattle, especially black cattle and sheep.

bazaar, two stories high. There are a seminary for Greek priests, a gymnasium, seven schools, six poorhouses, and an infirmary. The tanneries are of considerable importance, and there are some manufactories of iron articles. The adjacent country being very fertile, the inhabitants have extensive gardens, which are a source of great profit. They have very considerable trade, which was formerly chiefly directed to Riga, Königsberg, Memel, and Danzig, but of late years has turned to Odessa. The population has much increased of late years: Stein states it at 12,500, Hassel at 16,000, and Cannabich at 21,800.

The other principal towns are, Mstislawl, 5000 inhabitants; Dubrowna, 4000 inhabitants; Skiow, a fortified place, 2500 inhabitants; Orcha, 4000 inhabitants; and Homel, in the lordship of the same name belonging to Count Romanzow, in which there are 90 villages and 20,000 inhabitants. There is in the town a Lancasterian school for 400 peasant children, 200 of whom are boarded and instructed in handicrafts, agriculture, and gardening.

(Schubert, *Das Russische Reich*, 1835; Stein, *Geog. Lexicon;* Hörschelmann, *Geog.* 1833; Hassel, Cannabich, 1836.)

MOHILLA. [COMORO ISLANDS.]

MOHSITE, crystallized titaniate of iron. The primary form is a rhomboid. The crystals occur attached and macled. Cleavage not observable. Fracture conchoidal. Hardness sufficient to scratch glass readily. Brittle. Colour black; streak the same. Lustre metallic. Opaque. Does not obey the magnet. Found in Dauphiny.

MOIDORE. [MONEY.]

MOISSAC, a town in the south of France, capital of an arrondissement in the department of Tarn et Garonne, in 44° 7′ N. lat. and 1° 5′ E. long., 426 miles from Paris by the road through Orléans, Châteauroux, Limoges, Cahors, and Montauban.

This town is first noticed in the fifth century, when it was taken from the Romans by the Goths, from whom it was shortly after taken by the Franks. It was plundered by the Northmen, and subsequently came into possession of the Albigenses, from whom it was taken by Simon de Montfort. The wars of the English and the religious contests of the sixteenth century completed its ruin. The remains of the antient walls show how far its former extent exceeded its present size.

The town stands on the north bank of the Tarn (which is navigable), about three or four miles above its junction with the Garonne. The houses are tolerably well built, and among the most striking objects are the public fountain and the bridge over the Tarn. The country round the town is very delightful, and produces abundance of corn and wine and of delicious fruits. The population in 1831 was 5950 for the town, or 10,165 for the whole commune; in 1836 it was 10,618 for the commune. There are many mills for grinding flour for exportation to the colonies, and considerable trade is carried on in corn, oil, saffron, wine, and wool. There are eight fairs in the year.

The arrondissement has an area of 340 square miles, and comprehends 49 communes. It is subdivided into six cantons or districts, each under a justice of the peace. The population in 1831 was 62,489; in 1836 it was 62,735.

MOIVRE, DE. [DE MOIVRE.]

MOLA. There are two artists of this name, who were contemporaries, and both studied for a time under Albano. Of these the more celebrated one, PIERFRANCESCO, was born at Coldre, in the Milanese territory, in 1621, and after receiving his first instructions in art from his father, who was both a painter and architect, he studied successively under Giuseppino, Albano, and Guercino. He attained to great excellence both in design and colouring, and though his chief merit lay in landscape, to which he chiefly applied himself, he also painted history occasionally, and with much ability. His talents obtained for him the patronage of princes and nobles, and among others of Christina of Sweden. His reputation at length caused him to be invited to France, and he was making preparations for proceeding thither at the time of his death, which happened at Rome in 1666. According to other notices of him, the dates both of his birth and death vary from those above given, those assigned being respectively 1609 and 1665; besides which, he is stated to have been born at Lugano.

GIANBATTISTA MOLÀ, who was not at all related to the preceding, but is said to have been of French extraction, was born in 1620. He studied first at Paris under Vouet, and afterwards under Albano, at Bologna. Like his namesake Pierfrancesco, Gianbattista was an excellent landscape-painter, and well skilled also in perspective, though in other respects his inferior. He died in 1661.

MOLASSES, the uncrystallized syrup produced in the manufacture of sugar, and which is suffered to drain from the casks into a cistern, in what is called the curing-house, before the sugar is sent away from the plantation. To facilitate the draining, the casks are ranged upright on a frame-work of open joists over the cistern; several holes of about an inch diameter are bored in the bottoms of the casks; and before the newly made sugar is put into the hogsheads, or, as it is called, *potted*, an equal number of plantain-stalks, or sugar-canes from which the juice has been expressed, are placed in each cask, so that the ends protrude through the holes. These stalks or canes must be of an equal length with the cask, and they thus form so many channels or conduits for the passing away of the greater part of the molasses: some will always remain in the hogsheads, and, draining away by slow degrees, will in a great measure be lost during the voyage; but even after the arrival of the sugar in Europe a proportion of molasses, which is less or more according to the good or bad quality of the sugar, remains in the mass.

Nearly all the molasses made in the English sugar colonies was formerly converted into rum by fermentation and distillation on the estates; but the price of that spirit having declined, and improvements having been made in the processes of refining sugar in Europe, whereby a large proportion of West India molasses has been rendered crystallizable, a considerable and continually increasing quantity of molasses is shipped for that purpose. The syrups, which ultimately remain in a liquid form after passing through the processes of a refining-house, whether the same are the produce of Muscovado sugar or of molasses, are sometimes called molasses, but are more generally known as treacle.

The quantity of West India molasses imported and taken for consumption, in each year from 1820 to 1838, has been as follows:—

Years.	Imported. Cwt.	Consumed. Cwt.	Years.	Imported. Cwt.	Consumed. Cwt.
1820	39,991	6,314	1830	250,648	337,588
1821	58,185	57,141	1831	332,876	348,626
1822	76,298	78,.67	1832	565,685	566,689
1823	189,968	161,243	1833	717,934	643,986
1824	230,088	239,540	1834	678,392	507,980
1825	355,592	332,454	1835	526,321	622,479
1826	290,504	279,749	1836	528,306	657,082
1827	392,444	412,665	1837	582,283	592,575
1828	510,708	381,761	1838	649,820	527,099
1829	394,432	386,142			

The consumption duty charged on molasses is nine shillings per cwt., or three-eighths of the rate charged on crystalline sugar.

MOLD. [FLINTSHIRE.]

MOLDA'VIA, a province of northern Turkey, situated between 45° 25′ and 48° 13′ N. lat., and 26° 10′ and 28° 30′ E. long. It is bounded on the east by the Russian province of Bessarabia, which constituted a part of the principality previously to the peace of 1812, and from which it is separated by the river Pruth; on the south by the Danube and Wallachia, on the west by Transylvania, and on the north by the Buckowine and a part of Gallicia or Austrian Poland. Its greatest length from south to north is about 200 miles, its breadth about 120, and its area about 17,000 square miles. The Danube, which touches only a small part of Moldavia, receives within the limits of the principality the rivers Sireth and Pruth. Branches of the Carpathians extend along the western frontier of Moldavia, and separate the principality from Transylvania. These mountains send out offsets into the interior of Moldavia, which decline in height as they advance to the banks of the Sireth and Pruth, where they terminate in hills covered with vineyards. Moldavia is divided into Upper Moldavia, or Tzara de Suss, which is subdivided into four districts, and Lower Moldavia, or Tzara do Shoss, which is subdivided into nine districts. The climate of Moldavia is much colder in winter than might be expected in a latitude corresponding with the north of Italy: the rivers are generally frozen, and the ground covered with snow for a considerable time. The summers are exceedingly hot. The country is subject to earthquakes, but they are not very violent: the most remarkable was that which occurred on the night of the 3rd of February, 1821. The country possesses much mineral wealth, of which however little advantage has been taken, in consequence of the unsettled state in which the country has been for several centuries. There

is an abundance of rock-salt in the vicinity of the Carpathian mountains; there are also some mineral sources; and asphaltum of two kinds, red and black, is found in several parts; a great quantity of saltpetre is also produced, chiefly in the northern part of the principality. The sand of the river Bistritza contains gold, but not in a large quantity. The soil is generally exceedingly fertile, and, notwithstanding a very inferior state of agriculture, produces every kind of grain and vegetable in the greatest abundance. A great number of horses, cattle, and sheep are fed on the rich meadows which Moldavia contains, and the vast forests produce every kind of timber.

Jassy, or *Yassy*, the capital of Moldavia, is situated on the Bachlei, a small muddy stream which flows into the Pruth. It is in 47° 9′ N. lat. and 27° 25′ E. long. It is the residence of the voyvode, and of the principal authorities of the provinces, and is the seat of a Greek archbishop. The palace of the voyvode is on an eminence on the southern side of the town, and is surrounded by an old slight wall, which is a sufficient defence against bands of robbers, but would be small protection from an enemy; this is however nearly all that remains of the former strong fortifications of the town, which were destroyed in 1788. It has been frequently taken by the Russians, but has always been restored on the cessation of hostilities.

Yassi occupies a large space of ground, most of the houses being separated from each other by courts and gardens and plantations of trees. In 1723 it was almost entirely destroyed by fire; in 1772 it was desolated by the plague; in 1822 it was burnt by the Janissaries, when 4700 houses were destroyed; and in 1827 two terrible conflagrations reduced almost the whole town to a ruin. It now presents a melancholy aspect; instead of well-built houses, it consists chiefly of wooden buildings one story high, with wide spaces vacant or filled with ruins. The principal street, which is very broad, is furnished with poor-looking shops on each side; the other streets are narrow and crooked; most of them are laid with rough planks of oak; in the rainy season they are covered with wet mud, and in summer with a thick layer of black dust, which the slightest wind raises in clouds. The present population of Yassy is probably not more than from 15,000 to 20,000. Before the great fires in 1827 its population was 40,000, and it had 43 churches and chapels, 26 convents, one Catholic and one Lutheran church, a hospital, a bazaar, three public baths, and a Wallachian printing-office, the only one in the province. There are not many manufactures, but a considerable commerce is carried on, especially during the fairs which are held there.

Galacz, or *Galatz*, in 45° 23′ N. lat. and 28° 5′ E. long., is situated on the Danube, about three miles east of the junction of the Sireth and ten miles west of the junction of the Pruth with that river, and about eight miles north from Brailoff, which is the chief port of Wallachia. Galatz is the only port of Moldavia, so that it is the place of export and import for the whole province, and is the chief medium of the commerce carried on between Germany and Constantinople. By a law of 1834 the privilege of a free port has been granted to Galatz; and a steam communication having recently been established between Vienna and Constantinople, it is likely to become a general mart for Austrian merchandise, which will be shipped thence to the Levant and the ports of the Black Sea. Galatz is for the most part better built than the other towns of Moldavia, having numerous houses of stone, several Greek churches, a convent, an hospital, and a large bazaar always well filled with merchandise, together with a great number of warehouses for grain and other produce; the streets however are narrow and dirty. Vessels of 300 tons burthen can come close up to the town. In 1833, 193 vessels arrived at Galatz, of which 87 were Russian and 31 Ionian; the rest were Austrian, French, Sardinian, Tuscan, Neapolitan, and Servian. The population is about 12,000.

Fokzany lies on both sides of the Milkov, a small stream which forms the boundary between Moldavia and Wallachia, in 45° 41′ N. lat. and 27° 10′ E. long. It was formerly a large commercial town, but was almost destroyed in 1789, during the war between the Russians and the Turks. It was partly rebuilt afterwards, but was set on fire in 1822. It has still a tolerable trade in hardware. It contains several Greek churches and a convent. The population is about 2000. It is about 45 miles west from Galatz.

The population of Moldavia, according to the census of 1833, amounted to 450,000. It consists chiefly of Wallachians, Jews, Armenians, and gipsies.

The history of Moldavia is closely connected with that of Wallachia, from which it is separated only by a political boundary, having been originally the same country.

Moldavia has been subjected to great devastations by the several hordes which invaded the Byzantine empire, and a great number of its inhabitants, descended from the Roman settlers, retired to the west of the Carpathian mountains, in the present country of Hungary. About the middle of the thirteenth century a colony of the same inhabitants re-occupied the country, under a chieftain called Bogdan, whence it is called by the Turks and the natives Bogdania; whilst the name of Moldavia is derived from a river bearing a similar appellation. There must have been in the above-mentioned colony an admixture of Slavonians, as the name of the chieftain is Slavonic, and signifies Deodatus; and indeed the language of the inhabitants, who call themselves Romans, 'Roomoon,' consists of Latin with an admixture of Slavonic. Divine service is performed in the Slavonic tongue.

From that time the rulers of Moldavia, called *voyvodes* (a Slavonic term which signifies military leader), were often subject to the kings of Hungary, but also frequently asserted their independence, until they submitted to the protection of the Turks in 1536, under the voyvode Roydan, who acted according to the advice of his father Stephen in order to ensure by a voluntary submission privileges which it would have been impossible to obtain if the country had passed under the dominion of the Ottomans by conquest, an event which seemed unavoidable. The sultan granted to Moldavia the same privileges that he had given to Wallachia; the substance of which was, protection to the principality, for which an annual tribute was paid. The voyvodes were to be elected by the principal clergy and the boyars, or nobles, and their election was to be confirmed by the sultan, who was not to interfere in the local administration of the principality, neither were Turks permitted to settle there. The voyvodes had the power of life and death over their own subjects, and even the right to make peace and war, without being accountable to the Sublime Porte. No inhabitant of Moldavia was to be summoned by the Turkish government to Constantinople or any part of the Turkish dominions on any pretext whatever.

These conditions were maintained in the main points. Moldavia was however exposed to several wars which were carried on between Turkey and Poland, as the latter country had an old claim on the principality, which was finally abandoned by the peace of 1621.

In 1711 the Turks abolished the privilege of electing the voyvodes, and nominated to that dignity the Greek princes of the Fanar. [FANARIOTES.] The princes or voyvodes of Moldavia, called also *hospodars*, governed with the assistance of a council, called a divan, composed of twelve members appointed by the prince every year, with the exception of the metropolitan, whose ecclesiastical dignity entitles him to a permanent seat. The laws were administered according to a code framed after that of Justinian. There were a great many offices, several of which were copied from those of the Greek empire. The national army was composed of about 6000 men.

The tribute paid to the Porte was not so oppressive as the monopoly of trade: several articles, as wheat, timber, and cattle, were exported to Constantinople, and bought from the inhabitants at a fixed price which amounted to about one-fourth of the current market-price. As the hospodars were obliged to give considerable presents to the Turkish officers, and as they also sought to enrich themselves, the country was ground down by a most oppressive taxation.

Russia has long wished to possess this principality. With this view, in 1710, Peter the Great made a campaign, which turned out unsuccessful, and he only escaped destruction by the prudence of his wife Catherine, who bribed the grand-vizier in order to obtain a suspension of arms. Moldavia was occupied by the Russians in 1739, under field-marshal Munnich, but was evacuated by the peace of Belgrade. By the tenth article of the treaty of peace concluded between Turkey and Russia, at Koochook Kaynardgee, in 1774, Russia stipulated for several advantages to Moldavia and Wallachia, and to herself for permission to intercede with the Porte in favour of the above-mentioned principalities. The fourth article of the treaty of Yassy, Jan

9, 1792, confirms all the privileges of the two principalities, and exempts the inhabitants from the payment of tribute for two years. By the treaty of Bucharest, 1812, the eastern part of Moldavia, situated on the left bank of the Pruth, was ceded to Russia, the rights and privileges of the two principalities were confirmed, and a release from tribute granted for two years.

The events of the Greek revolution had a fatal influence on Moldavia, which was entered by Prince Ipsilanti at the head of a troop of the Heterists, or Greek patriots; he was defeated and obliged to escape to the Austrian territory, but the Turkish troops, which occupied both the principalities, committed great excesses. This led to many demands on the part of Russia, which were temporarily adjusted by the treaty of Akerman in 1826. At the peace of Adrianople, which followed the war of 1828 and 1829, the prospects of the principalities were much improved by the separate article to that treaty, concluded on the 2nd September, 1829, by which it was stipulated 'that the hospodars should, instead of seven years, as had hitherto been the case, be invested with their dignity for life, except in cases of voluntary abdication or expulsion for crimes.' The same hospodars are to administer the internal government of their provinces, with the assistance of their divan, according to their own pleasure, but without any infraction of the rights guaranteed to the two countries by treaties or hattisherifs (ordinances of the sultan), nor shall their administration be disturbed by any command tending to the violation of those rights. All the fortified points and cities occupied by the Turks on the left bank of the Danube were to be abandoned by them. No Turks were permitted to settle in the principalities, and those who possessed real property there were obliged to sell it in the course of eighteen months. The principalities are relieved from all those contributions of corn, provisions, cattle, and timber, which they were formerly bound to furnish for the supply of Constantinople and the victualling of the fortresses on the Danube. In no case are labourers to be demanded for any forced service. In order to indemnify the Turkish treasury for the losses which may be sustained by the renunciation of those rights, the principalities are bound, independently of the annual tribute formerly paid, to pay yearly a pecuniary compensation, the amount to be hereafter determined. Moreover upon every fresh nomination of the hospodar, in consequence of death, resignation, or deposition, the principality where that event occurs shall be bound to pay to the Sublime Porte a sum equal to the annual tribute of the province. With the exception of these sums, no tribute or present of any kind shall under any pretext whatever be demanded from the hospodars. All this is certainly a great improvement, as the resources of the country were entirely crippled by the vexatious and arbitrary mode in which the products of every kind were appropriated by the Turks. This article, which may be considered as the constitution of the principalities, was proclaimed and put into execution in 1832. (For further particulars see WALLACHIA.)

MOLE. [TALPIDÆ.]

MOLECULARITY. [THEORIES OF MOLECULARITY.]

MOLIE'RE was the name assumed by Jean Baptiste Poquelin, who was born at Paris, on the 15th of January, 1622. His father was a *tapissier*, and also held the office of 'valet-de-chambre-tapissier' to Louis XIII. Young Poquelin was intended for the same trade, and remained in his father's shop till he was fourteen years of age, having been merely taught to read and write. He had a grandfather who was very fond of him, and often took him to the theatre at the Hôtel de Bourgogne: he even expressed a wish that his grandson might become a celebrated actor, and his words made such an impression on the youth, that he gradually became disgusted with his trade. As he returned home from the play one day in a state of melancholy, his father asked the cause, and learned that he desired a superior education. His grandfather joined in his entreaties, and he was sent to the Collège de Clermont, which was under the care of the Jesuits, where he remained till the end of the year 1641.

When his studies both in literature and philosophy were ended, he was obliged to fill his father's office about the king's person, and he attended Louis XIII. in the expedition from which resulted the taking of Perpignan from the Spaniards. After this there is a gap in his biography, and we find him in 1645 performing with a company of citizens in the Faubourg St. Germain, who at first acted for pleasure, but afterwards attempted to combine profit with amusement. At this period he took the name of Moliere. The company was unsuccessful.

Here comes another gap of eight years, and we find him in 1653 playing at Languedoc, whither he had been invited, at the head of a company, by the Prince de Conti, who appreciated his histrionic talents. In this company was Madeleine Béjart, whose daughter subsequently became the wife of Molière. He afterwards went with his company to Lyon, where, in 1653, he produced his first play, 'L'Etourdi,' with such success, that two other companies joined him. This piece is amusing from the variety of situations, which however have the disadvantage of resembling each other too closely. The portrait of the Etourdi shows the beginning of Molière's tendency to sketch character, though character is here subservient to incident. In 1654, having returned to Languedoc, he produced his second piece of 'Le Dépit Amoureux,' which was likewise successful. The Prince de Conti was so pleased with his productions as to make him director of the entertainments which he gave in the province, and even to offer to him the place of secretary. Molière however refused this offer.

After remaining four or five years in Languedoc, the company quitted that province for Grenoble, where they played during the carnival. They then went to Rouen, and finally to Paris, where Molière was introduced to the king, Louis XIV., before whom his company played the tragedy of 'Nicomède,' in 1658, at a theatre erected in the guard-hall of the old Louvre. Molière felt that in tragedy his company was inferior to that of the Hôtel de Bourgogne, and therefore, when the play was ended, he came forward and observed, that they were but faint copies of excellent originals, and hoped that the king would allow them to play one of the little comic pieces which had been successful in the provinces. The king granted the request, and the piece, which was one of those early works of Molière which have not been collected, was played with success. The king wished the company to remain at Paris, gave them the title of 'Troupe de Monsieur,' and allowed them to play, alternately with the Italian comedians, at the theatre called Le Petit Bourbon. In 1660 they removed to the Palais Royal.

In 1658 Molière's early pieces of 'L'Etourdi' and 'Le Dépit Amoureux,' which had been acted with such success in the provinces, were played with great applause at Paris, and in 1659 was produced his celebrated 'Précieuses Ridicules,' which was so successful, that the prices of admission were trebled on the second day of performance, and the piece notwithstanding had a four months' run. With this comedy the fame of Molière may be said to begin; the modern reader may find in it only an ordinary farce, but the Parisian public perceived that the author was a bold and strong portrayer of prevailing characters and manners It is written in prose, and the design is to ridicule those ladies, called *Précieuses*, who indulged in an affected way of talking peculiar to the time. In 1660 Molière produced 'Le Cocu Imaginaire' with great success, though it was not so popular as its predecessors. It is ingeniously constructed, but it is not so much an exhibition of character as the 'Précieuses.' 'Don Garcie de Navarre,' brought out by Molière in 1661, was unsuccessful, and injured his reputation. It is called an heroic comedy, and is a weak, heavy production, scarcely readable. His fame was again raised by the 'Ecole des Maris,' which was produced in the same year with great success. The characters of the two principal personages in this piece resemble those of the brothers in the 'Adelphi' of Terence. An excellent piece followed in the same year, called 'Les Fâcheux,' which perhaps exhibits Molière's peculiar talent more than any of his plays. That talent consisted in the portraying of character; and in proportion as there is more or less of character to draw, does Molière become strong or weak. The object of 'Les Fâcheux' was to exhibit every species of disagreeable person in one short drama, and though the plot is nothing, the different characters of the 'bores' of the period, such as a man who talks of nothing but hunting, a composer, a card-player, a duellist, &c., pass in quick succession, and present a most happy phantasmagoric picture of the times.

In 1662 appeared 'L'Ecole des Femmes,' which had no very great success in Paris, although the principal character, Agnes, is the original from which Wycherly has taken his Mrs. Pinchwife, in the 'Country Wife,' subsequently altered by Garrick into the 'Country Girl.' Molière was so indignant at the slight success of this piece, that he wrote another, called 'La Critique de l'Ecole des Femmes,' in

which he held up its opponents to public derision. One of the characters, a ridiculous marquis, is supposed to represent the Duc de Feuillade. This 'Critique,' which was played in 1663, was very successful. A little piece entitled 'L'Impromptu de Versailles' was produced the same year, which consists merely of a satirical conversation among the comedians. It is preceded by a 'Remerciement,' or poem of thanks to the king, who had, in the year of its production, granted Molière a pension of a thousand livres. He was greatly esteemed at court, where he held the office which had been filled by his father; and the king is said on one occasion to have sat with him at the same table to shame some of his officers who treated him with haughty coolness. Molière's happiness would have been greater had he not about this time married Armande Béjart, then about 17, whose lively and coquettish disposition kept him in all the agonies of jealousy. To relieve himself from domestic disquietude, he pursued his labours with additional ardour, and wrote 'Le Mariage Forcé,' and 'La Princesse d'Elide,' which were produced in 1664, and Le Féstin de Pierre,' produced in 1665. Of these the first is a mere farce, which exhibits however Molière's aptitude to sketch character in the two little parts of the peripatetic and sceptical philosophers; the second is one of those heavy mixtures of serious comedy and ballet which, however effective they might have been with splendid decorations, do not now repay a reader the trouble of perusing them; and the third is an ill-constructed piece, with a spark of humour here and there, chiefly remarkable for being one of the numerous versions of the story of 'Don Juan,' which is the subject of Mozart's opera, and for certain censures bestowed upon it by the Sieur de Rochemont, who considered it impious. In 1665 the king engaged Molière's company for his own service, granting them a pension of 7000 livres, and they took the title of the 'Troupe du Roi.' A little piece, called 'L'Amour Médecin,' followed up the attack on the medical profession, which Molière had incidentally commenced in the 'Féstin de Pierre.'

His excellent comedy 'Le Misanthrope' was produced in 1666, and is reckoned among his chef-d'œuvres. It abounds in character and correct views of society. In the same year appeared 'Le Médecin malgrè lui,' a humorous attack on the physicians, well known to the English by Fielding's version, entitled 'The Mock Doctor.' With respect to the date of the celebrated comedy 'Le Tartuffe,' there is a little difficulty. In collections of Molière's works it is placed at some distance after the 'Misanthrope,' and is dated 1667; but some lines in the 'Misanthrope' appear to allude to a book which the bigots of the day, offended by the 'Tartuffe,' published as Molière's, in order to injure his reputation. The discrepancy has been accounted for by stating that the first three acts of 'Le Tartuffe' were played in 1664, but that the entire piece was not acted till 1677. However this may be, on its very first production the more bigoted part of the community were enraged; and such earnest applications were made to the king, that he ordered the piece to be withdrawn. The representations of Molière induced the king to revoke this order, but Molière did not consider it prudent to perform it at once. About the same period he produced three insignificant little pieces, 'Melicerte' (a mere fragment), 'Pastorale Comique,' and 'Le Sicilien;' and in 1668 appeared his 'Amphitryon,' a clever version of the 'Amphitryon' of Plautus, altered by the addition of a wife to Sosia, and the substitution of a prophecy of the birth of Hercules for his actual birth. The admirable comedy of 'L'Avare' was brought out in the same year,* but played at first with little success, owing, it is said, to its having been written in prose, which the audience did not think calculated for pieces of five acts. It is one of Molière's very best pieces; nothing can be better than the character of the miser (who is supposed to be imitated from the Euclio of Plautus's 'Aulularia'), and we cannot refrain from admiration at the boundless ingenuity displayed by the author in placing him in every possible situation adapted to draw him forth. If 'Les Fâcheux' is the prototype of those pieces where the greatest variety of characters is introduced in succession, 'L'Avare' is, on the other hand, the prototype of those which are chiefly occupied in the exhibition of one character in all its phases. The piece was rendered by Fielding as 'The Miser.' Having produced in the same year a successful piece, 'George Dandin, which is a droll little farce, Molière ventured on a second representation of 'Le Tartuffe,' to the great indignation of the bigots. The theatre was crowded to excess, and the piece was just about to begin, when a prohibitory order arrived from parties who held authority during the absence of the king, who was in Flanders. The actors, not having the king's permission in writing, returned the spectators their money, and extinguished the lights. Molière instantly despatched two of his actors to the king, to solicit his protection; and on their return with an order in their favour, the piece was played without interruption. Of the merit of this celebrated comedy, so well known to the English public by the imitation called 'The Hypocrite,' there is no doubt; but whether religious imposture is or is not a fit subject for ridicule on the stage, is a question we leave open to the opinion and feelings of our readers. 'Monsieur de Porceaugnac,' a farce representing the awkwardness of a pompous country-gentleman in a large metropolis, and containing an incidental satire against the physicians, was represented in 1669 with great success, and the famous 'Bourgeois Gentilhomme,' brought out in the following year, was equally fortunate. This, although in five acts, is a farce of the most extravagant kind, and being, as it is called, a comédie-ballet, the author has allowed it at the close to run almost into a pantomime. In construction it is exceedingly loose, and this is the case with all Molière's pieces that go by the name of 'comédie-ballet;' so easy is it to avoid difficult unravellings by the introduction of dances. Several of the pieces named above belong to this class, although they have not been so specified. In spite of its extravagance the 'Bourgeois Gentilhomme' is a favourite piece, and allusions are perhaps more frequently made to it than to any other play of Molière's. The pompous ignorance of the principal character and the pretensions of his several fashionable masters are extremely laughable; but as far as construction goes, it is a mere succession of farcical incidents.

In 1672 Molière produced his 'Femmes Savantes,' one of his best comedies, in which the learned ladies and witlings of the time are admirably satirised. Its success however was at first not very great, the subject being rather too dry and recondite for the public at large. Before the production of this piece he had assisted in composing a 'tragédie-ballet' on the subject of Cupid and Psyche, and had brought out two inferior pieces, 'La Comtesse d'Escarbagnus,' and 'Les Fourberies de Scapin.'

In the year 1672 Molière became reconciled to his wife, with whom he had long been at variance, and at the same time quitted a milk diet, to which he had restricted himself on account of a complaint in the chest, for animal food. This increased his complaint, but he worked hard at the composition of 'Le Malade Imaginaire,' which was produced in 1673, and is one of his most entertaining pieces, and his severest attack on the physicians. On the third day of the representation of this comedy Molière felt the pain in his chest much increased, and his wife, and Baron the actor, endeavoured to dissuade him from playing. Their efforts were vain, and while acting the part of 'Argan,' a convulsion seized him, which he endeavoured to conceal by a laugh. As soon as the piece was over he entered Baron's box, who remarked that he appeared worse than ordinary. His hands were cold, and Baron accompanied him home. Soon after his arrival he began to spit blood, which at length flowed from his mouth in such abundance as to suffocate him. The date of his death is the 17th of February, 1673. The rites of sepulture were at first refused to Molière, but the king prevailed on the archbishop of Paris to allow them, on condition that the ceremony should be celebrated without any pomp. He was accordingly buried by two priests, who accompanied the body without chanting, in the cemetery behind the chapel of St. Joseph, Rue Montmartre. All his friends attended, each bearing a flambeau; and his widow exclaimed, 'What! will they refuse burial to a man who deserves an altar!' Even on the morning of his interment she had been obliged to appease the rage of a bigoted mob which had assembled at her door by flinging out a hundred pistoles. In this country and in the present age it is scarcely possible to read the treatment of Molière's remains without indignation, especially when we find the writers of his life speaking in the highest terms of his goodness of heart and integrity.

Our opinion of Molière has been given in the remarks on particular pieces, and we need only briefly repeat that his

* According to Grimarest, it had been already played before this, and without success, and the production mentioned above was its second appearance; but this account does not accord with the register of the 'Comédie Française.'

strength lies in the delineation of character. His plots are often excessively inartificial and improbable, but in character he is almost unrivalled. He also enters deeply into the humour of a comic situation, though here it is rather difficult to measure his merits by a right standard, as many of his most striking situations are notoriously borrowed from the Italian comedies. On character therefore alone rest his unequivocal pretensions to fame, for even if the idea be borrowed from other writers, still the minute portraying of an individual character, with all its propensities and bearings, requires a master spirit, and if the design be borrowed, the execution must still be original. He has naturally often run into the failing, too common with those who make distinctive character their principal object, of degenerating into caricature; but still, where a personage is made the symbol of a single passion or whim, the omission of the qualifying tints of real life necessarily throws out the single characteristic so prominently, that caricature almost necessarily arises. The personages of Theophrastus and La Bruyère become caricatures, from their representing certain qualities taken abstractedly, instead of a mixture such as is observable in real life.

Besides his dramatic works, Molière translated nearly the whole of Lucretius, but all his translation has been lost, except a few lines, which are introduced in the 'Misanthrope.' His works have been so frequently published, and can be so easily procured in every shape and size, that it is almost useless to point out any particular edition. A very good one was however published at Paris in 1838, in which the actors' names are printed after the dramatis personæ, and which thus shows that Molière always played himself the principal comic parts, and also forms a very agreeable illustration to the dramatic history of the times. In this respect it is superior to the more splendid edition recently published with wood-cuts by Johannot.

MOLI'NA, LOUIS, born at Cuença in Castile, entered the order of Jesuits in 1553. He studied at Coimbra, became a learned divine, and taught theology for twenty years in the college of Evora. He died at Madrid in the year 1600. He wrote commentaries upon Thomas Aquinas, and a treatise 'De Justitia et Jure;' but the work which has rendered his name famous as the head of a school of theology is his book 'De Concordia Gratiæ et Liberi Arbitrii,' printed at Lisbon in 1568, with an appendix to it, published after. In this work Molina undertook the task of reconciling the freewill of man with the foreknowledge of God and predestination. He observed that the early fathers who had preceded the heresy of Pelagius had defined predestination as being the foreknowledge of God from all eternity of the use which each individual would make of his freewill; but St. Augustine, who had to oppose the Pelagians, who granted too much to freewill, spoke of predestination in a more absolute and restricted sense. Molina says, that man requires grace in order to do good, but that God never fails to grant this grace to those who ask it with fervour. He also asserts that man has it in his power to answer, or not, to the calling of grace.

The opinions of Molina, which were adopted, enlarged, and commented upon by the Jesuits, and strongly opposed by the Dominicans, gave rise to the long disputes concerning grace and freewill. The partisans of Molina were called Molinists, and their antagonists Thomists, from Thomas Aquinas, the favourite divine of the Dominican order. Already in Molina's lifetime his opinions were stigmatised as savouring of Pelagianism. After numerous disputations, Pope Paul V., in 1609, forbade both Jesuits and Dominicans from reviving the controversy. But soon after Jansenius, bishop of Ypres, wrote a book in which he discussed the question concerning grace after the manner of St. Augustine. His book was denounced by the Jesuits, and thus the dispute began afresh between the Molinists and the Jansenists. [JANSENISTS.] Pascal, in his second 'Lettre Provinciale,' gives an account of the state of the controversy in his time. He says that 'the Jesuits pretend that there is a sufficient grace imparted unto all men, and subordinate to their freewill, which can render it active or inactive, while the Jansenists maintain that the only sufficient grace is that which is efficacious, that is to say, which determines the will to act effectively. The Jesuits support the 'sufficient grace,' the Jansenists the 'efficacious grace.'

Molina must not be confounded with *Molinos* (*Michael*), a Spanish clergyman of the seventeenth century, who was the founder of the theory of piety and devotion called Quietism, of which Fénélon and Madame Guyon were distinguished supporters. [FENELON.]

MOLINISTS. [MOLINA.]

MOLLEBART. [BARREN LAND.]

MOLLUSCA. [MALACOLOGY; CONCHOLOGY; CONCHIFERA, and the various articles relating to this class of Invertebrate animals.]

MOLOSSI, a people of antient Epirus, who occupied the southern part of that country along the banks of the river Arachtus, and extended to the shores of the Ambracian Gulf. Their principal town was Ambracia. The Molossi, under their king Alexander, about 320 B.C., gained the preponderance over the rest of Epirus, which they maintained under his successors, of whom Pyrrhus was the most celebrated. [EPIRUS.] After the defeat of Perseus, Paulus Æmilius, the Roman general, ravaged the country of the Molossi, as well as the rest of Epirus, and destroyed their towns. The effects of the devastation which he caused were still visible in the time of Strabo.

MO'LOTHRUS, Mr. Swainson's name for a genus of birds placed by him in the subfamily *Icterinæ*, under the family *Sturnidæ*, with the following

Generic Character.—Bill very short, thick, finch-like, conic, entire; the culmen not flattened, but slightly arched from the base, which is rather elevated. Wings lengthened, pointed; the first quill longest. Tail slightly rounded. Middle toe as long as the tarsus; lateral toes of equal length; hind toe shorter than the tarsus. All the claws rather small, and fully curved.

Example, *Molothrus Pecoris*, Sw. (*Icterus Pecoris*, Temm.; *Emberiza Pecoris*, Wils.; *Fringilla Pecoris*, Gm.).

Description—*Male.*—Head and neck brown, inclining to black; the rest of the plumage shining black, glossy with violet reflections on the breast, and shot with greenish above; irides hazel; legs and claws black.

Female.—Sooty-brown above, pale beneath.

Young.—Like the female, with the breast spotted.

Habits, Food, Reproduction, &c.—This species, which is the *Cow-Pen Bird*, *Cow Blackbird*, *Cow Troopial*, and *Cow Bunting* of the American colonists, leads a wandering life, appearing in the middle and northern States of the Union at the end of March or the beginning of April. The winter is past in the Southern States and warmer parts of the Continent, where they are to be seen with the Red-wings (*Icterus Phœniceus*) and the common blackbirds (*Quiscalus versicolor*) in the ploughed fields, according to Nuttall. They attend on the cattle constantly, like many of the *Sturnidæ*, intent on picking up the insects which are disturbed by the quadrupeds or haunt their droppings, nor do they in the colder weather refuse to hunt for aquatic insects and small mollusks on the margins of ponds, where, according to the author last quoted, they may be seen in the winter season industriously turning over the leaves of water-plants to glean such as may there adhere. But though they, with their associates, are occasionally found in the rice and corn-fields, it seems that their depradations are not co-equal with those of their companions, for the food of the cow-bunting appears to consist chiefly of insects and such food as makes them for the most part independent of the farmer.

The most curious of its habits remains to be told; for this vagabond bird, like our cuckoo, never prepares a nest for itself, but drops its egg in another's nest. As a concomitant to this ordinance they do not pair, but polygamy prevails among the flock without exciting any great jealousy; though now and then there may be a battle, as is usual in such cases, in which the strongest generally prevails. The egg, which is nearly oval, varies in colour: sometimes the ground-colour is white tinged with green and sprinkled with spots of brown, and sometimes pure white with nearly black spots. It is a very little larger than that of the blue-bird. This supposititious egg is, it appears, always hatched before the legitimate ones. Were this not the course of nature, the species would probably perish; for the legitimate nestlings would suffocate the newly-hatched foundling, as the latter actually does suffocate the young of its foster-mother, when they afterwards come into existence.

The favourite nests appear to be those of the Red-eyed and White-eyed Flycatchers; and the Maryland Yellow-throat; those of the Blue-bird, the Indigo Bird, the Chipping Sparrow, the Song Sparrow, the Blue-eyed Yellow Warbler, the Blue-grey Flycatcher, the Golden-crowned

Thrush, and Wilson's Thrush, are however also selected as places of deposit. From the various and interesting accounts of this curious phenomenon we select that of Nuttall, whose personal observations we proceed to lay before the reader. 'When the female is disposed to lay, she appears restless and dejected, and separates from the unregarding flock. Stealing through woods and thickets, she pries into the bushes and brambles for the nest that suits her, into which she darts in the absence of its owner, and in a few minutes is seen to rise on the wing, cheerful and relieved from the anxiety that oppressed her, and proceeds back to the flock she had so reluctantly forsaken. If the egg be deposited in the nest alone, it is uniformly forsaken; but if the nursing parent have any of her own, she immediately begins to sit. The Red-eyed Flycatcher, in whose beautiful basket-like nests I have observed these eggs, proves a very affectionate and assiduous nurse to the uncouth foundling. In one of these, I found an egg of each bird, and the hen already sitting. I took her own egg and left the strange one; she soon returned, and, as if sensible of what had happened, looked with steadfast attention and shifted the egg about, then sat upon it, but soon moved off, again renewed her observation, and it was a considerable time before she seemed willing to take her seat; but at length I left her on the nest. Two or three days after, I found that she had relinquished her attention to the strange egg, and forsaken the premises. Another of these birds however forsook the nest on taking out the Cow-bird's egg, although she had still two of her own left. The only example perhaps to the contrary of deserting the nest when solely occupied by the stray egg, is in the Blue-bird [BLUE-BIRD], who, attached strongly to the breeding-places, in which it often continues for several years, has been known to lay, though with apparent reluctance, after the deposition of the Cow-bird's egg. My friend Mr. C. Pickering found two nests of the Blue-eyed Yellow Warbler, in which had been deposited an egg of a Cow-bird previously to any of their own; and unable to eject it, they had buried it in the bottom of the nest, and built over it an additional story! I also saw, in the summer of 1830, a similar circumstance with the same bird, in which the Cow-bird's egg, though incarcerated, was still visible on the upper edge, but could never have been hatched. At times, I think it probable that they lay in the nests of larger birds, who throw out the egg, or that they drop their eggs on the ground without obtaining a deposit, as I have found an egg of this kind thus exposed and broken. I have also remarked sometimes two of these eggs in the same nest, but in this case one of them commonly proves abortive.' The same author in 1831 saw a hen Red-eyed Flycatcher sitting on two eggs and one of the Cow-bird, and he adds that this species, *Vireo olivaceus*, and (more lately) *Vireosylva olivacea* of Bonaparte, *Muscicapa olivacea*, Linn., appears to be its most usual nurse. He has known this *Vireo* begin her incubation with only an egg of each kind, whilst in other nests he has observed as many as three belonging to the *Vireo*, as well as that of the intruder; and he suggests that, from the largeness of the egg, the nest probably immediately feels full to the incubating bird, so as to induce her to sit directly, when the larger egg, being brought nearer to the body of the nurse than her own, is first hatched, generally, as he believes on the 12th or 13th day. The legitimate eggs are hatched about a day later, are often stifled by the superior size of the stranger, which is affectionately nursed by the poor dupe of a dam, and when the young are dead, are conveyed to a distance by the parent and dropped; but they are never found immediately below the nest, as would be the case, if they were ejected by the young Cow-bird, as is done by the young cuckoo. [CUCULINÆ, vol. viii., pp. 208-9.] 'Indeed,' continues Mr. Nuttall, 'as far as I have had opportunity of observing, the foundling shows no hostility to the natural brood of his nurses, but he nearly absorbs their whole attention, and early displays his characteristic cunning and self-possession. When fully fledged, they quickly desert their foster-parent, and skulk about in the woods, until at length they instinctively join company with those of the same feather, and now becoming more bold, are seen in parties of five or six in the fields and lanes gleaning their accustomed subsistence. They still however appear shy and watchful, and seem too selfish to study anything more than their own security and advantage.' The Cow-bird is but a poor songster. Its flitting migrations are generally made in the night or in the grey of the morning.



Molothrus Pecoris.

a, Male; *b*, female; *c*, young. (Wilson.)

Geographical Distribution.—Besides the localities noted above, this species is also found in Mexico; but, according to Audubon, it is rare and a visitor only in Louisiana. The Prince of Musignano, in his *Geographical and Comparative List*, gives 'America generally' as its locality.

Mr. Darwin (*Journal and Remarks*) states that another species (*Le Troupiale commun* of Azara), of a purplish-black colour, with a metallic lustre, feeds on the plain near Maldonado in large flocks, mingled with other birds. Several, he says, may often be seen standing on the back of a cow or horse. While perched on a hedge, and pluming themselves in the sun, they sometimes attempt to sing, or rather to hiss: 'the noise is very peculiar; it resembles that of bubbles of air passing rapidly from a small orifice under water, so as to produce an acute sound.' Azara states that this bird, like the cuckoo, deposits its eggs in other birds' nests. 'I was several times told by the country people that there was some bird with this habit; and my assistant in collecting, who is a very accurate person, found a nest of the sparrow of the country (a *Zonotrichia*) with one egg in it larger than the others, and of a different colour and shape.' This egg is now in the museum of the Zoological Society of London.

MOLSHEIM. [RHIN BAS.]

MOLTON, SOUTH. [DEVONSHIRE.]

MOLUCCA ISLES, constitute a part of the Indian

Archipelago, and are situated between 5° N. lat. and 9° S. lat., and between 122° and 131° E. long., being dispersed over the sea, which extends from the eastern coast of Celebes to the western coast of Papua or New Guinea. In a more limited sense, the term Molucca Islands is only applied to the islands from which spices are obtained, as Amboyna, Banda, Ceram, &c. Others apply the term only to the northern group, or the islands lying in the Molucca Strait, between Celebes and Gilolo, including the last-mentioned island.

Soil and Surface.—We are very imperfectly acquainted with the natural features of these islands, as the Dutch, who have settlements on several of them, and who keep their sovereigns in a considerable degree of dependence, have always been very anxious to exclude all other Europeans, and have succeeded in doing so, except for a few years during the wars between 1798 and 1814. It is however known that nearly all these islands are mountainous, and that some of them contain peaks which rise to the height of 7000 or 8000 feet. The rocks of which they are composed seem to be mostly of a volcanic nature, and there are at least eight volcanoes still in action. These volcanoes seem to be the southern extremity of that extensive series which commences on the north in the peninsula of Kamtchatka, and continues southwards through the Kurules, Japan, and the Philippines, enclosing the eastern shores of Asia, as it were, with a volcanic barrier. On the other hand, it may be said that the most southern of these volcanoes constitute the eastern extremity of another volcanic barrier, which skirts Eastern Asia on the south, and proceeds from the Moluccas westward through the Lesser Sunda Islands and Java, where it terminates. Like other volcanic countries, the surface of all these islands is very rugged and broken, but their lower parts possess a great degree of fertility; and the coast, which in many parts rises from the water's edge to a considerable elevation with a very steep acclivity, contains a great number of harbours for every kind of vessels. Except where the declivity is too steep, the mountains are covered with forests, consisting of a great variety of trees, many of which are useful as timber or for cabinet-work.

Climate.—As none of these islands are more than 9 degrees from the equator, the climate is hot all the year round, but the heat is not excessive, on account of their comparatively small size and the uninterrupted continuance of the monsoons for at least ten months of the year. The seasons are dependent on these periodical winds. The rainy season begins in October or November, with the north-westerly monsoon; for while the north-east monsoon and fair weather prevail in the Chinese Sea and in the sea between Sumatra and the eastern coasts of Africa, the wind blows from north-west and west in the seas surrounding the Moluccas. Vessels bound to Canton, and arriving at the Sunda Islands during the north-east monsoon, take advantage of this circumstance. Instead of passing through the Sunda Straits and struggling against the wind and current in the Chinese Sea, they sail along the southern coast of Java, and pass through one of the straits which divide the Lesser Sunda Islands from one other into the sea of Banda, or that portion of the Indian Ocean which extends from the islands of Celebes and Flores eastward to New Guinea. Hence they pass between Ceram and Gilolo to the Pacific, and sail along the eastern side of the Philippines and through the strait of Balingtang to Canton. During this wind the rains fall, as in all tropical climates, in torrents, but seldom continue above two or three hours at a time; they generally come down from two to five o'clock in the afternoon or during the night. The annual quantity of rain is very great, but its amount is not known. The rainy season is also the hot season, and the mid-day heat during that time varies between 89° and 95°; the extremes are 77° and 100°, or somewhat more. The rains cease in the end of April or in May, when the wind settles in the south-east, and the weather becomes more temperate. Rains however occur from time to time, and the atmosphere contains considerable moisture. The mid-day heat is a few degrees lower than it is during the rains, and the difference between it and the temperature of the cool nights is greater, but hardly exceeds 12°.

Productions.—The agricultural productions do not differ from those of Java, with the exception of rice, which is not cultivated, but imported, though not in great quantities. The common food of the people is derived from the sago-palms, which grow wild in the forests and are also planted. Fish, wild deer, and hogs are also articles of food. The productions raised for exportation are limited to the clove and nutmeg trees, which are the only two articles that the Moluccas send to Europe. In addition to these articles they send to the markets of China edible birds'-nests, sea-slugs, and shark-fins. A small quantity of gold is also exported, as well as birds of paradise. These beautiful birds visit these islands at certain seasons of the year, coming over from New Guinea and the Aroo Islands, where they breed. The number of articles of export would be much increased if these islands were open to all European vessels, as the fertility of the soil and the climate favour the growth of all tropical products. Even at present they afford several articles, which are neglected, as turtle-shells, mother-of-pearl, honey, bees'-wax, ambergris, sandal-wood, and various kinds of beautiful wood for cabinet furniture. While the English were in possession of the Moluccas, they obtained from them cordage, cables, and timber.

Inhabitants.—These islands, like nearly all those which constitute the Indian Archipelago, are inhabited by two races, the Malays and the Papuas. The Malays are in possession of the coasts, where they cultivate the ground or gain their subsistence by fishing. They are Mohammedan, and among them are many sherifs, or pretended descendants of Mohammed. They seem to have adopted that religion shortly before the arrival of the Portuguese in 1510. Their language contains a great number of foreign words, and Dr. Leyden is of opinion that the Ternate or Molucca language has been an original tongue. The Papuas have been extirpated on the smaller islands, but they still maintain their ground in the mountainous districts of the larger islands. They seem to belong to the same race which inhabits the continent of Australia, New Guinea, and the Andaman Islands, but they do not exhibit that ferocity of character by which the inhabitants of the two last-mentioned countries are distinguished. They are described as an inoffensive race who cultivate the ground.

Division.—The number of islands probably amounts to some hundreds, of which however many are small and uninhabited. They may be divided into three groups: the Gilolo group, or Proper Moluccas; the Ceram group; and the Timor Laut group. The Gilolo group is the most northern, and extends from 2° S. lat. to 3° N. lat., and contains the islands of Gilolo, Morty, Mandioly, Batchian, Ooby, and Mysole, with numerous smaller islands lying between and about them, among which the islands of Ternate and Tidor are the most important. In figure Gilolo resembles Celebes, being composed of four long peninsulas, which are connected near 10° N. lat. Its greatest length from south to north may be 220 or 230 miles, and its surface, on a rough estimate, about 8000 miles, or about that of Wales. Little is known of it, except that the northern and north-eastern peninsulas rise into high mountains, whilst the southern attain only a moderate elevation. It seems to have a considerable population. The northern peninsula is or was subject to the sultan of Ternate, and the southern to the sultan of Tidor; but the two peninsulas projecting towards the east have their own sovereigns. Morty rises with a gentle ascent to a considerable height, and is said to have good harbours. Mandioly and Batchian are separated from one another by a narrow strait, which affords good anchorage. They are of moderate elevation, and are governed by their own sovereign, to whom also the island of Ooby belongs. The last-mentioned island is very little known. The islands of Ternate and Tidor are small, being only from 20 to 30 miles in circuit, but the soil is fertile, and they are very populous. Their sultans possess the greater part of Gilolo, and also several districts on the eastern coast of Celebes. To this group belong two smaller groups lying farther north-west. The eastern group, called the Salibabo Islands, consists of three islands of some extent, Tulour, Salibabo, and Kabruang, and several smaller ones. The island of Salibabo has a good harbour at Leron, in the narrow strait which divides that island from Kabruang. The western group, called the Sangir Islands, consists of a larger island and numerous smaller islands. Sangir Island is about 70 miles long: through its central part runs a ridge of high mountains, which terminates on the north in a volcano, which in 1711 made an eruption accompanied by a dreadful earthquake.

The Ceram group occupies the middle, between 3° and 5° S. lat., and comprehends the two large islands of Ceram

and Booroo, and among the smaller ones, which lie to the south of them, the Spice Islands, or Amboyna and Banda Islands. The Chinese export much wood for cabinet-work from Ceram, as well as from Booroo, which is about 75 miles long from east to west, and 38 miles wide. Its surface is also rugged, and rises into high mountains. Respecting the Spice Islands, see AMBOYNA and BANDA.

The Timor Laut group is the most southern and least known. It consists of the large island of Timor Laut and four others of considerable extent, Larat, Little Key, Great Key, and Key Watela, with several smaller ones. Timor Laut is about 70 miles long and 25 miles wide; but that is nearly all we know of this and the adjacent islands. The island of Aroo [AROO], lying farther east, is also sometimes considered as belonging to the Moluccas.

History.—When the Portuguese were exploring the eastern seas in the beginning of the sixteenth century, they arrived at the Moluccas in 1510, and had hardly begun to form settlements when the vessels of Magalhaens, arrived from the east, and a dispute arose between the Portuguese and Spaniards respecting the possession of the islands, which lasted for several years. The Dutch took these islands from the Portuguese about a hundred years afterwards, and, in order to secure to themselves the exclusive trade in nutmegs, maces, and cloves, they formed numerous small settlements on nearly all of them, by which they kept the petty sovereigns in subjection, and, with their assistance, were enabled to extirpate all the spice-trees in the islands, except Amboyna and Banda, which they subjected entirely to their sway. In 1796 the British took possession of them, and kept them to the peace of Amiens (1801), when they were restored to the Dutch. The British again took possession of them in 1810, and again gave them up to Holland at the treaty of Paris in 1814. Since that time the Dutch have abandoned several of the smaller establishments, but they still maintain several at Ternate, Tidor, and other places.

(Forest's *Voyage to New Guinea and the Moluccas*; Stavorinus's *Voyages to the East Indies*; Delano's *Voyages and Travels*; Crawfurd's *History of the Indian Archipelago*; Count Hogendorp's *Coup d'Œil sur Java, &c.*; and *Description Geogr., Histor., et Commerciale des Java et des autres Isles de l'Archipel Indien.*)

MOLYBDE'NUM, a metal discovered by Scheele, in 1778, in a mineral which resembles and had been confounded with plumbago: he gave it the Greek name of *molybdæna*. This mineral is composed of sulphur and molybdenum; and it has also been met with in other states of combination presently to be mentioned. This substance was however first reduced to its metallic state by Hjelm, another Swedish chemist, and its properties have been since particularly examined by Bucholz and Berzelius.

The metal is obtained from the native sulphuret by reducing it to fine powder and heating it in aqua regia; by this the sulphur is converted into sulphuric acid, and the metal into molybdic acid, which remains in the state of a white powder after being heated to expel the sulphuric acid; when this is very strongly heated with charcoal, it is reduced to the metallic state; or the metal may be procured by passing hydrogen gas at a high temperature over the acid in a porcelain tube. This metal is obtained as a porous mass or in globules, and has not yet been procured in the state of a button or bar. The grains are somewhat crystalline; sometimes they are of a silver-white colour. When obtained by the reduction of the oxide, this metal has not much lustre, but acquires it by burnishing. Its density is 8·6. When long exposed to the air at ordinary temperatures, it appears to tarnish, but the oxidation is superficial. By exposure to air and heat, it is first converted into brown oxide, afterwards it becomes blue, and eventually molybdic acid, which is white. This oxidation does not however take place completely, but only at the surface. Sometimes the metal takes fire at the moment of oxidation. It does not decompose water.

Ores of Molybdenum.—Oxide of molybdenum occurs encrusting the sulphuret of molybdenum, and also between its laminæ in thin layers. Its structure is thin fibrous, earthy, friable, and pulverulent. Colour pale yellow or greenish.

It has been found only in small quantity in Scotland, Norway, and North America. Its composition has not been ascertained.

Molybdic acid also occurs in nature in combination with lead and silver.

Sulphuret of Molybdenum, Molybdenite, is the most common mineral of this metal. Occurs crystallized and massive. Primary form a rhomboid. Crystallizes in hexagonal crystals. Cleavage very distinct, perpendicular to the axis. Fracture indistinct. Hardness, scratches talc, is scratched by calcareous spar. Colour lead-grey, and streak the same. Flexible in thin laminæ, but not elastic. Lustre metallic. Opaque. Specific gravity 4·591. Rubbed on paper, it leaves a grey metallic mark, and on porcelain a greenish one. *Massive variety* amorphous; structure foliated, granular. When heated by the blow-pipe on charcoal, emits a sulphurous vapour, and leaves a powdery residue. It occurs in various parts of the world—in England, France, Germany, and America; more especially however in Saxony and Bohemia. It contains, according to Bucholz, 60 parts of molybdenum and 40 of sulphur.

Molybdenum combines, as already noticed, with oxygen, and forms two oxides and one acid; but these we have not thought it requisite to describe, any more than its other compounds, for it is not used in any form whatever.

MOLYNEUX, WILLIAM, was born at Dublin, 17th April, 1656. He entered the university of that city in 1671, whence, after taking the degree of B.A., he removed to London, and entered the Middle Temple, where he studied law during three years. On his return to Ireland he married (1678) the daughter of Sir William Domville, the king's attorney-general. The same year his wife was attacked by an affection of the eyes, which increased so rapidly, that in a few months her sight was wholly destroyed. To divert the melancholy thoughts to which his wife's affliction incessantly gave rise, he took to the study of the mathematics. 'This,' he says, 'was the grand pacificum I used; these were the opiates which lulled my troubled thoughts to sleep.' In the mathematics he had probably received some instruction from his father, Captain Samuel Molyneux, who was author of a treatise on gunnery on the principles expounded by Galilei concerning the motion of projectiles. In 1683 he took an active part in the formation of the Dublin Philosophical Society, of which he was first secretary and afterwards president. In 1685 he was appointed by the English government to inspect the fortresses of the Netherlands, and the same year was elected a Fellow of the Royal Society of London. After the dispersion of this Society in 1688, consequent upon the political disturbances of Ireland, brought about by the severities of Tyrconnel's government, he, with many other Protestants, was obliged to take refuge in England; but he returned to Ireland after the battle of Boyne in 1690. In 1692 he sat in the Irish parliament as one of the representatives of the university of Dublin, and at the close of the session was nominated by the government commissioner of forfeitures, with an annual salary of 400*l.*, which appointment however he thought fit to decline, chiefly on account of the bad reputation of the other commissioners named.

His principal work is a treatise on optics, entitled 'Dioptrica Nova,' 4to., London, 1692 and 1709. It was the first work on the subject which had appeared in English, and contained a great many propositions practically useful and clearly demonstrated, for which reasons it continued in request for many years. The revisal of the proof sheets was undertaken by Dr. Halley, who added, in an Appendix, his celebrated theorem for finding the foci of optic glasses. Flamsteed had also assisted in the preparation of the work, and in particular had furnished solutions of three propositions, which Molyneux placed after the solutions given by himself. At this circumstance the astronomer-royal, with whom Molyneux had previously been on terms of intimacy, took such offence, 'that,' says Molyneux, 'he broke his friendship with me, and that with such inveteracy, that I could never after bring him to a reconciliation; so that at last I slighted the friendship of a man of so much ill-nature and irreligion, however ingenious and learned soever.'

Among the many persons of literary eminence with whom he maintained a correspondence, Locke was held by him in particular esteem, and in the last year of his life he came to England for the purpose of visiting that philosopher. He died in Dublin, October 11, 1698.

Besides his 'Dioptrica' and twenty-seven papers on miscellaneous subjects inserted in the 'Philosophical Transactions' between the years 1684 and 1716, he published 'Translation of the Six Metaphysical Dissertations of Des cartes, together with the objections against them by Thomas Hobbes,' London, 1671; 'Sciothericum Telescopicum, or a

New Contrivance for adapting a Telescope to an Horizontal Dial,' 4to., Dublin, 1686; 'Journal of the Three Months' Campaign of His Majesty in Ireland, with a Diary of the Siege of Limerick,' 4to., 1690; 'The Case of Ireland being bound by Acts of Parliament stated,' 8vo., Dublin, 1698-1706-70-76.

(*Account of the Family and Descendants of Sir Thomas Molyneux, Knt.*, Evesham, 1820, 4to.; Hutton's *Mathematical Dictionary; Biographia Britannica.*)

MOMBAÇA, or MOMBAS, is a town situated on that part of the eastern coast of Africa which is called the coast of Zanguebar, and in 4° 4′ S. lat. and 39° 38′ E. long. It is built on the eastern side of an island, which occupies the greater portion of a bay, about 5 miles long and 3 miles wide. The island is three miles long by two broad; the two straits which divide it from the continent are hardly half a mile across. The eastern strait constitutes the harbour of the town, which is one of the most perfect in the world. It has good anchorage ground at the entrance, sheltered by an extensive reef on each side; the shore is so steep and rocky, that in many places wharfs are unnecessary. The cliffs surrounding the island are of madrepore, and rise with a steep ascent, so that the whole island is like a huge castle encircled by a moat, over which there is only a single ford at its north-western extremity, and even that is dangerous. The castle, built by the Portuguese in 1635, on a rock of moderate elevation, lies to the south of the town. The town is not large, and consists of the city and the Black Town, which occupies the most northern portion of it. The former, which was once inhabited by the Portuguese, is now inhabited by the Arabs. Some free coloured people and slaves constitute the population of the Black Town. The population is not known, but probably does not exceed 3000 or 4000. Though the Arab inhabitants of this town are poor, they cause their children to be instructed with great care in reading and writing, and in order that they may at the same time acquire a good knowledge of their religion, sentences from the Koran are used as the tasks. The commerce is not considerable, and is mostly in the hands of some Banyans from Hindustan, who, during the favourable monsoon, send a small quantity of ivory and other produce to Bombay, for which they obtain in return East India and English manufactures.

Vasco de Gama visited this port in 1498, and was well received, but nearly fell a sacrifice to the treachery of the inhabitants. It was afterwards taken and burnt by Francisco de Almeida in 1505, but he did not keep possession of it. Twenty-three years later it was taken by Nunho da Cunha, after a stout resistance from the inhabitants, and was again reduced to ashes. It seems, that from that time the Portuguese remained in possession of it for nearly two centuries. It is not known when they lost it, but in 1720 it was in possession of the Imam of Muskat. It appears however that he lost it soon afterwards by a rebellion of the inhabitants. In 1824 the Imam sent a force against it. The Arabs, who inhabit the town and adjacent coast, being aware that they could not resist the Imam, put themselves under the protection of the British, and hoisted the English flag, by which means they have preserved their independence. The Arabs are governed by a sheik, whose office is properly hereditary, but the course of descent has often been interrupted by intrigues and civil dissension.

(Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar.*)

MOMENT OF INERTIA. [MOMENTUM, or MOMENT OF INERTIA.]

MOMENTUM, or MOMENT. This word has been used in various senses. It simply means a motion, the word *momen*, from *movimen*, being found in several antient authors. *Momentum* was originally one rapid motion, whence it came to be used for a very short time; whence our word *moment*, which, in common life, means an indivisible instant of time. Thus an effect which requires a single second to produce it would not be properly momentary. But the word has passed into mechanics in its original sense of motion, and is used to signify the amount of an effect of motion, actual or conceivable. Thus we have one use in the article VIRTUAL VELOCITIES, another in LEVER, a third in MOMENTUM OF INERTIA, and a fourth, the most common of all, which we proceed to explain in this article.

The English synonym of this fourth sense is 'quantity of motion,' and we may observe that in this sense it is most usual, in our language, to adopt the Latin form *momentum*, instead of the abbreviation *moment*. It is impossible to give an actual definition of momentum, in simple terms: but the conception is obtained by those who observe that the effects produced by *matter* in *motion* (both notions are necessary) may be augmented either by giving the same motion to more matter, or greater motion to the same matter. Imagine a BALLISTIC PENDULUM, and suppose a bullet of two pounds weight to strike it with a velocity of 100 feet per second. The same oscillation which is thus produced, may, it is found, be produced by a bullet of one pound weight striking with a velocity of 200 feet. The same effect being produced in both cases, though by different quantities of matter and different velocities, there is something which we may assert to be unaltered by the substitution of the smaller bullet with the larger velocity. This something is the momentum, or quantity of motion, a notion of a cause which is asserted to be the same when effects are the same. This mere definition would be useless except in connection with principles observed or deduced, by which it may be applied. That there is a reality in connection with it, all who know the difference between light and heavy, as these words are frequently used, are well aware. A heavy blow, for instance, does not mean a blow with a heavy body: thus the fall of a poker may give a light blow, while that of a book of one-tenth part of its weight may give a heavy one. The difference in these cases is that of momentum.

The velocity remaining the same, the momentum or quantity of motion increases with the mass moved; and the mass remaining the same, the momentum increases proportionally to the velocity communicated. But the peculiar proposition on which the utility of the term and the notion depends is this, that in all mechanical effects produced by matter in motion, a diminution of the mass may be compensated by a proportionate increase of the velocity: that is, M being the number of units of mass, and V of velocity, as long as the product of M and V remains the same, the effect produced is the same. Thus in the preceding instance $M \times V$ is 2×100 in the first case, and 1×200 in the second. And as long as $M \times V = 200$, the same effect will be produced, if the pendulum be supposed so heavy that the addition of M to its mass is not worth considering.

This product, MV, is the measure of the momentum, and is generally called the momentum itself. Here (as in MASS) tacit reference is made to a unit of momentum: the equation

$$\text{Momentum of M with velocity V} = M \times V$$

implies that a unit of momentum is that produced by a unit of mass moving with a unit of velocity. But if the unit of mass moving with a unit of velocity should be considered as having the momentum a, the equation should be

$$\text{Momentum of M with velocity V} = a \times M \times V.$$

In vol. x., p. 350, where reference is made to this article, for *momentum* or *moving force* read *momentum* or *quantity of motion*.

MOMENTUM, or MOMENT of INERTIA. Let us conceive a system of bodies possessing weight, and immoveably attached to a fixed axis, round which the whole system can turn. It is known from experience, as well as deducible from the laws of motion, that the nearer the bodies are placed to the axis, the more rotatory motion may be communicated by a given force. The *moment of inertia* is a name given to a mathematical function of the masses in the system and of their positions with respect to the axis, on the magnitude of which the rotatory motion produced by a given pressure, acting for a given time, depends. This function is the sum of the products made by multiplying the number of units in each mass by the number of units in the square of its distance from the axis. Thus, if m, m', m'', &c. be the masses of material points situated at distances r, r', r'', &c. from the axis, the moment of [illegible] is $mr^2 + m'r'^2 + m''r''^2 +$ &c. If the body be a co[illegible] at a solid, and if dm be one of the elements of the [illegible] $\int r^2 dm$, distance r from the axis [illegible] the moment of inertia [illegible] extent of the integration being made throughout the [illegible] the solid.

[illegible] communicated

Let A B be the axis, and let a press[illegible] as would, were a to the system at the point P, and [illegible] m which consists of mass P placed there, cause the [illegible] h a velocity v, being at that single mass only to revolv[illegible] The momentum of this the distance a from the ax[illegible] of m, m', and m'', in conse velocity is Pv. Let the sy[illegible]

quence of this pressure, begin to revolve with an angular velocity θ (measured in theoretical units [ANGLE]). The consequence is, that m, m', and m'' begin to revolve with velocities $r\theta$, $r'\theta$, and $r''\theta$, and momenta $mr\theta$, $m'r'\theta$, $m''r''\theta$. Now if pressures which would just prevent this motion in the same time as the applied pressure generated it were applied in the opposite direction, the three pressures so applied would counterbalance the pressure at P. But [PRESSURE] the pressures which in the same time produce motions are to one another as the momenta produced, so that if $a.Pv$ represent the pressure at P, those applied in the contrary direction at m, m', and m'', are $a.mr\theta$, $a.m'r'\theta$, and $a.m''r''\theta$. But the first acts perpendicularly at the extremity of the arm a, the others at the arms r, r', and r''. Hence $a.mr\theta \times r + a.m'r'\theta \times r' + a.m''r''\theta \times r''$ must be the same as $a.Pv \times a$, whence it is evident that

$$\theta = \frac{Pva}{mr^2 + m'r'^2 + m''r''^2}$$

the denominator of which is what has been called the moment of inertia of the system. Hence it follows that the communication of a given pressure at a given distance from the axis of rotation will cause an angular velocity which is inversely as the moment of inertia: if the masses or their distances were increased in such a way as to double the moment of inertia, the angular velocity produced by a given pressure would be only the half of what it would have been before the change.

The moment of inertia may be represented by Σmr^2 (sum of all the terms of the form mr^2) and the whole mass by Σm. Let k be such a distance that if the whole mass were concentrated at that distance, the moment of inertia would not be altered: that is, let $\Sigma m \times k^2$ be $= \Sigma mr^2$. Then k is what was called the *radius of gyration*. [GYRATION.]

The property which is most important in the actual determination of moments of inertia by the integral calculus is one in virtue of which the moment may be found with respect to any axis when it is known with respect to a parallel axis passing through the centre of gravity. Let PQ be an axis passing through G the centre of gravity, and let AB be another axis parallel to PQ and distant from it by GR or k. Then, whatever the moment of inertia may be when PQ is the axis, that with respect to AB is found by adding the moment of inertia of the whole system concentrated in G, or $\Sigma m \times k^2$. That is

ter I. (axis AB) = M. of I. (axis PQ) + Mass of sys-
RGR².

the most appears that of all ax[illegible]rallel to a given axis through ti.of inertia is least for that axis which passes greatest motntre of gravity; so that, *cæteris paribus*, the passes through produced by a given force when the axis pass through the entre of gravity. Of all the axes which right angles to there of gravity there are three, each at properties, and are calr two, which possess remarkable

From what has been principal axes. [ROTATION.]
the moment of inertia is as it may easily be supposed that
rtant in the consideration of rotatory motions as the rectangle in mensuration. We shall see a further use of this function in OSCILLATION, and also a practical mode of finding the moment of inertia.

MOMO'RDICA ELATE'RIUM, or Wild Cucumber, an annual plant, of which the fruit, and more particularly the juice surrounding the seeds, are used in medicine. The ripe fruit is about two inches long, roundish, muricate, green, and fleshy; possessing the power of ejecting, along with a mucilaginous greenish juice, the compressed ovate smooth seeds; on which account it is called the squirting cucumber. The juice has an extremely bitter taste, and even in very small quantity acts violently as a hydrogogue cathartic, producing numerous watery stools. It owes its power to an acrid and drastic bitter extractive, to which the name of *Elaterin* has been given. This is soluble in alcohol, æther, and fat oils, but scarcely soluble in water or dilute alkalies or acids, while strong acids destroy it.

The very minute dose which is required of elaterium recommends it in many cases as a remedy in dropsy, especially ascites, but few persons can bear the violence of its action for any considerable time; two or three days should always be allowed to elapse before repeating the dose. It is apt to cause vomiting as well as purging, and a dose of even a quarter of a grain may produce such extreme action as to sink the patient into a state of alarming debility.

It should therefore only be used when milder means have been previously tried without success, and it should be exhibited with great precaution. Surrounding the abdomen with a tight bandage will lessen the disposition to fainting, which is apt to be experienced from the rapid removal of the fluid distending the cavity of the peritoneum.

MOMOT, or MOTMOT. [PRIONITES.]

MOMPAX. [GRANADA, NEW.]

MONA. [ANGLESEY; MAN, ISLE OF.]

MO'NACHA. [MUSCICAPIDÆ.]

MO'NACHISM (from the Greek μόνος, alone; whence μονάζειν, to live alone; and μοναχὸς, a solitary, or a monk). In this its proper and original signification of a solitary, a monk may be considered as only another name for an anachoret, or anchoret (in Greek, ἀναχωρητὴς), that is, a person who withdraws from society, a recluse; or for an eremite, corrupted into hermit (in the same way as the old and more correct ethnick has been corrupted into heathen), in Greek, ἐρημίτης, that is, a dweller in a desert or solitude.

The practice of retiring from the world for mortification or pious contemplation has been in use from time immemorial in the Brahminical and other religions of the East, and was known even among the Jews long before the birth of Christianity. We need mention only the instance of the prophet Elijah, to whom Catholic writers indeed are fond of referring as the founder of monachism. An example of still more venerable antiquity is afforded by the Nazarites, male and female, described in the sixth chapter of the Book of Numbers, whose 'vow of separation' however lasted only for a certain fixed time.

In the earliest days of Christianity, many of the converts to the new religion, in their ambition to signalise themselves by extraordinary piety, adopted a remarkable severity of life and strictness of religious observance, whence they came to be known by the name of ascetics (in Greek, ἀσκηταί), that is, literally, exercisers. Another name by which they are sometimes spoken of by the early ecclesiastical writers is Spoudæi (σπουδαῖοι), that is, zealots. The connection of these ascetics with the description of persons afterwards called monks has been a subject of much disputation, the admirers and champions of the monastic system in general asserting the identity of the monks and ascetics, and their opponents maintaining that asceticism, as it existed in the primitive church, and monachism, as it sprung up in a later age, were two things wholly distinct. The truth appears to be that the early ascetics were certainly not universally, nor perhaps even generally, monks or solitaries; but still a separation, more or less rigid, from social life was one obvious mode of mortification and devotional abstraction, and one that was undoubtedly practised by some of the ascetics, though most probably without anything resembling the vows and other methodical restrictions which make part of monachism in its mature state. The ascetics themselves, it may be here observed, are commonly derived from the Jewish sect of the Therapeutæ, or Essenians, who inhabited the banks of the lake Mareotis, in the delta of Egypt, and who, having previously cast off much of the antient reverence of their nation for the Mosaic

law, had embraced Christianity in great numbers very soon after its promulgation. 'The austere life of the Essenians,' says Gibbon, 'their fasts and excommunications, the community of goods, the love of celibacy, their zeal for martyrdom, and the warmth, though not the purity, of their faith, already offered a very lively image of the primitive discipline.' (*Decline and Fall*, chap. 15.) And in a note, after admitting that Basnage, in his 'Histoire des Juifs,' has demonstrated, in spite of Eusebius and a crowd of modern Catholics, that the Therapeutæ were neither Christians nor monks; he adds, 'It still remains probable that they changed their name, preserved their manners, adopted some new articles of faith, and gradually became the fathers of the Egyptian ascetics.' Afterwards (chap. 37), he seems distinctly to represent the ascetics as the fathers of the monks. 'They,' he says, 'seriously renounced the business and the pleasures of the age; abjured the use of wine, of flesh, and of marriage; chastised their body, mortified their affections, and embraced a life of misery as the price of eternal happiness. In the reign of Constantine (A.D. 306-337) the ascetics fled from a profane and degenerate world to perpetual solitude or religious society. Like the first Christians of Jerusalem, they resigned the use or the property of their temporal possessions; established regular communities of the same sex and a similar disposition; and assumed the names of *hermits*, *monks*, and *anachorets*, expressive of their lonely retreat in a natural or artificial desert.'

It is admitted on all hands that the immediate founders of monachism were two Egyptians, named Paul and Anthony. St. Jerome calls the former the author of that mode of life, the latter its illustrator—'hujus vitæ auctor Paulus, illustrator etiam Antonius.' (Hieron., *Ep.* 22, *ad Eustoch.*, c. 16.) Paul is designated the Thebæan. An account of St. Anthony, as he is styled, and of the progress of the monastic system during his life, which extended from A.D. 251 to A.D. 356, has already been given under his name (ii. 96). We shall only note here that the first monastic community is said to have been established at Phaium, near Aphroditopolis, in the Thebais of Egypt, about the year 305 or 306, that is, after the cessation of the persecutions which had originally driven Anthony, Paul, and others to the deserts. Strictly speaking however this and other monasteries appear to have been founded rather by Anthony's disciples, and in obedience to the spirit which his example had diffused, than directly under his own superintendence.

Of these disciples, the most eminent was Pachomius: if the Decian persecution and Anthony gave rise to monachism, monasteries owe their origin to Pachomius and the peaceful times of Constantine. The antient writer of the 'Acta Pachomii' makes Anthony acknowledge this himself in the following speech to one of the disciples of Pachomius:—'When I first became a monk, there was as yet no monastery in any part of the world where one man was obliged to take care of another, but every one of the antient monks, when the persecution was ended, exercised a monastic life by himself in private. But afterwards your father Pachomius, by the help of God, effected this.' Gibbon has in a few words well sketched the first stage of the progress of the new institution:—'The prolific colonies of monks multiplied with rapid increase on the sands of Libya, upon the rocks of Thebais, and in the cities of the Nile. To the south of Alexandria the mountain and adjacent desert of Nitria were peopled by five thousand anachorets; and the traveller may still investigate the ruins of fifty monasteries which were planted in that barren soil by the disciples of Anthony. In the Upper Thebais the vacant island of Tabenne was occupied by Pachomius and fourteen hundred of his brethren. That holy abbot successively founded nine monasteries of men and one of women, and the festival of Easter sometimes collected fifty thousand religious persons, who followed his angelic rule of discipline.' This is said in allusion to the fable that Pachomius, who survived till the middle of the fourth century, had received his rule by special revelation from an angel. The other most celebrated early propagators of monachism are Hilarion, another disciple of Anthony, who carried the system into Palestine, about A.D. 328; St. Athanasius, bishop of Alexandria, who brought it to Rome, A.D. 340 [ATHANASIUS]; Eustathius, bishop of Sebaste, or Sebastia, by whom it was soon after extended to Armenia and Paphlagonia; St. Basil, who established it in the province of Pontus, A.D. 360 [BASIL]; and St. Martin, bishop of Tours, by whom it was, about A.D. 370, introduced into Gaul, whence it is generally supposed to have been imported into the British Isles by Pelagius, about the beginning of the fifth century.

At first all the communities of monks followed the rule of Pachomius, and therefore they were not distinguished into various orders, as in later times, but took their names from the places where they were established, as the monks of Mount Scethis, of Tabenne, of Nitria, of Canopus, &c. But besides the monks that lived in communities, and who were called from that circumstance *Cœnobitæ*, or sometimes *Synoditæ*, and by the Egyptians, according to St. Jerome, *Sauches*, there were for some ages divers other species, which the ecclesiastical antiquarians have taken much pains to distinguish. Some lived, although in the same district of the wilderness, yet all in separate caves or cells, and without any association or common government, in which case the collection of hermitages was called a *Laura*, according to Epiphanius. Another sort are described by Cassian under the name of *Sarabaitæ*, and were called by the Egyptians *Remboth*, according to St. Jerome, who says that they lived two or three together, without any rule, but each after his own fashion, taking up their abode for the most part in cities and fortified stations (*castellis*). In other respects he gives a very bad account of them: although they were wont to contend with each other, he says, in extraordinary feats of fasting, yet at other times they would indulge to as much excess in riotous festivity; all things about them were affected; loose gloves (manicæ), puffed-out boots (caligæ follicantes), coarse clothes, frequent sighing, much visitation of the young women, violent inveighing against the clergy. In short, concludes Jerome, they are the pests and banes of the church. Another species of these early monks or solitaries were those called Stylitæ, that is, pillar saints (from στύλος, a pillar), the founder of whom was one Simeon, a Syrian shepherd, who having, in A.D. 408, when he was only thirteen years old, left his flocks and joined a monastic community, afterwards withdrew himself to a mountain about 30 or 40 miles east from Antioch, and there, confining himself by a chain within a mandra, or circle of stones, proceeded at last to take up his residence on the top of a pillar, which was gradually raised from the height of nine to that of sixty feet. Simeon Stylites died A.D. 451, after having, it is said, existed for thirty years at the last-mentioned elevation in the air. 'Habit and exercise,' says Gibbon, 'instructed him to maintain his dangerous situation without fear or giddiness, and successively to assume the different postures of devotion. He sometimes prayed in an erect attitude, with his outstretched arms in the form of a cross; but his most familiar practice was that of bending his meagre skeleton from the forehead to the feet; and a curious spectator, after numbering twelve hundred and forty-four repetitions, at length desisted from the endless account.' This strange sort of piety however does not seem to have proved very contagious; among the few pillar saints, besides the contriver of the practice, whose names are recorded, the most famous are, another Simeon, styled the Younger, who is said to have occupied his airy watch-tower for sixty-eight years, and one Alypius, who left the bishopric of Adrianople for this other sort of episcopacy, and, it is affirmed, kept singing psalms and hymns between heaven and earth, at all hours of the day and night, for the full space of threescore years and ten, while a choir of monks and two choirs of virgins, seated on the ground below, lent the aid of their voices to swell the strain. About the beginning, or, as others think, about the middle, of the fifth century, a pious individual, named Alexander, set up a new fashion of monachism at Constantinople, the professors of which received the name of Acœmetæ (in Greek, ἀκοιμηταί), that is, the watchers, or the sleepless, from their practice of dividing themselves into three classes, which took the performance of divine service in unbroken succession, so as to keep up a constant sound of devotion throughout the entire round of the twenty-four hours. The Acœmetæ, sometimes called *Studitæ*, from Studius, a Roman nobleman, who became one of their society, and built a famous monastery for them, which, after him, was named *Studium*, were held in great estimation, and became very numerous at Constantinople. Alongside of the Stylitæ may be placed another description of fantastic enthusiasts, the Βοσκοί, or Grazing Monks, whose whim it was to live like the beasts of the field, inhabiting no houses, and eating neither bread nor flesh, but roaming about upon the mountains

as they continued without ceasing to make the wilderness resound with their hymns and psalms, and when it was time to eat, every man, taking his knife in his hand, and proceeding to cut or dig for himself a dinner of herbs from the ground. Still another sort of old monks is made mention of under the name of *Gyrovagi*, the Vagabond Monks, as the epithet may be translated. St. Benedict describes these as rambling about continually from province to province, getting themselves well entertained for three or four days at every cell they came to, mere slaves to their gluttonous appetites, and in all things worse even than the Sarabaritæ.

From this sketch it is evident that the institution of monachism had arrived at a state of very considerable corruption both in the Eastern and the Western churches, when St. Benedict arose to reform it, in the latter, in the earlier part of the sixth century. [BENEDICT, SAINT, and BENEDICTINE ORDER, vol. iv., p. 213.] It does not appear however that Benedict, in drawing up what is called his Regula Monachorum, or Rule, had any intention of founding a new order of monks; he writes as if he designed it for the use of all the monasteries then existing. In point of fact, from the year 530, or 532, according to others, when he established his first monastery at Monte Casino, till after the commencement of the thirteenth century, when the new mendicant orders made their appearance, all the principal monasteries that were founded throughout Europe were of the Benedictine order. The Carthusians, Cistercians, Grandimonteuses, Præmonstratenses, Cluniacs, &c., were all only so many varieties of Benedictines. The historians of monachism indeed reckon up twenty-three subdivisions of this order in all, distinguished only by such local or other specific appellations, and by some slight differences of habit and discipline. The innovations introduced by Benedict were of course longest in penetrating to the more remote corners of Christendom; and perhaps in no other part of Europe were they so long in being generally received as in the British Islands. Bede and others denominate the system which prevailed among the British monks before the arrival of St. Augustin in 597, the apostolic discipline; but it was probably merely the antient rule of Pachomius. It is even disputed whether St. Augustine brought over with him the rule of St. Benedict; and at all events it is tolerably clear that that rule was not universally established in the British churches till its observance was enforced by St. Dunstan and his friend Oswald, in the reign of Edgar, after the middle of the tenth century.

Meanwhile in the Eastern church also monasteries and nunneries had been made the subject of legal regulation by a constitution of Justinian (Nov. 5), addressed to Epiphanius, the archbishop of Constantinople and œcumenic patriarch, in the consulship of Belisarius, A.D. 535. By these enactments no monastery could be founded except the ground was first consecrated by the bishop within whose diocese it was, who was required to put up a cross on the spot. Persons were not permitted to assume the monastic habit till after a three years' probation, and the abbots (ἡγούμενοι) were required, during this time, to examine well into their life, conversation, and fitness for the monastic profession. On being approved, the candidates assumed the dress and tonsure. Both free persons and slaves were alike admissible into monasteries, and were received on the same footing in all respects. A master might claim and take away his slave within the three years, if he could prove that the person was his slave, and had run away for theft or any other offence; but not otherwise. Thus the monasteries became a place of refuge to slaves who had severe masters. The law ordained that the monks should eat together, and should all sleep in a common dormitory, each in his own bed; but an exception was made in favour of those called anachorets and hesuchasts (ἀναχωρηταὶ καὶ ἡσυχασταί), who led a contemplative life in perfection (such is the phrase), and were allowed to have separate cells. It seems that a man could leave his monastery and enter the world again, though it was considered sinful; but as all the property which he had not disposed of before entering the monastery (subject to some provisions for his wife or children, if he had any) became the property of the monastery on his entering it, if he chose to leave it, he could not take with him or recover any part of his property. Celibacy and chastity were required of the monks, though at this time marriage was permitted to certain clerical persons, as singers and readers. Further regulations on the life of monks and nuns are contained in the 134th Novel. A monk was prohibited from entering a female monastery (for one word only is used in these laws for male and female convents), and a nun was prohibited from entering a male monastery, under any pretext whatever. Other regulations to the same general effect of ensuring chastity and the due observance of all monastic duties are prescribed by the legislator.

In the earliest age of the monastic system, the monks were left at liberty as to many things which were afterwards made the subject of strict regulation by the laws either of the state or the church. St. Athanasius, in one of his epistles, speaks of bishops that fast, and monks that eat and drink; bishops that drink no wine, and monks that do; bishops that are not married, and many monks that are the fathers of children. Originally, too, monks were all laymen; and, although it gradually became more and more the common practice for them to take holy orders, it was not till the year 1311 that it was made obligatory upon them to do so by Pope Clement V. Nor was any vow of celibacy or any other particular vow formally taken by the earliest monks on their admission. It appears even that it was not unusual for persons to embrace the monastic life with the intention of only continuing monks for a few years, and for those who had spent some time in a monastery actually to return to the world. We have just seen how the practice as to some of these points came at length to be regulated by the Imperial law.

The word nun, in Greek Νοννίς, in Latin *Nonna*, is said to be of Egyptian origin, and to signify a virgin. Another account is, that the original meaning of the Latin *nonna*, *nonnana*, or *nonnanis*, was a penitent. The Italians still use *nonno* and *nonna* for a grandfather and grandmother. Cyprian and Tertullian, in the latter part of the third century, make mention of virgins dedicating themselves to Christ. Such a practice was indeed a natural mode of self-sacrifice, which had been familiar to all religions. Some of these ecclesiastical or canonical virgins, as they were called, appear already to have formed themselves into communities, similar to those of the monks; but others continued to reside in their fathers' houses. The progress of female monachism however, from the rudeness and laxity of the first form of the institution, to the strict regulation which characterised its maturity, moved on side by side with that of male monachism.

Monasteries are called by the Greek fathers not only Μοναστήρια and Μοναί, but also sometimes σεμνεῖα, that is, holy places; ἡγουμενεῖα, the residences of the abbots, styled ἡγούμενοι, or chiefs; μάνδραι, inclosures; and φροντιστήρια, places of reflection or meditation, that being one of the purposes to which they were very early applied. For a general account of the different sorts of religious houses, and of their government, see the articles ABBESS, ABBEY, ABBOT, and CONVENT.

The habits and other peculiarities of the principal orders of monks and nuns are explained under the name of each. It is only necessary to notice here, that the three vows of chastity, poverty, and obedience are taken by all monks and nuns at their admission. All, both male and female, likewise receive the tonsure, like all the ecclesiastics of the Romish church. In all the orders the candidate for admission must first undergo a novitiate, which varies from one to three years. The age at which novices may make profession differs in different countries; but the rule laid down by the council of Trent only requires that the party, whether male or female, should be sixteen. It is scarcely necessary to add, that in the modern constitution of monachism, the vows and status of a professed person, as indeed of all ecclesiastics, are by the law of the Roman church for life and indelible.

The greatest revolution by which the history of monachism has been marked since the establishment of the rule of St. Benedict, was the rise, in the beginning of the thirteenth century, of the Mendicant Friars. Of these an account has already been given under the word FRIARS: and further particulars will be found under the names of the several orders.

The general dissolution of monastic establishments was one of the first consequences of the Reformation in our own and all other countries that separated from the Romish church. There are however a few Protestant monastic establishments in some parts of Germany. Even in some Catholic countries, especially in Germany and France, the number of these establishments has been greatly reduced

within the last fifty or sixty years, and the wealth and power of those of them that still exist most materially curtailed. The reform of the German monasteries was begun by the emperor Joseph II.; those of France were all swept away at the commencement of the Revolution; but some of them have been set up again, though with diminished splendour, since the restoration of the Bourbons. Since the relaxation of the penal laws, several Roman Catholic nunneries have been erected in England and Scotland, as well as in Ireland. Monks and nuns of all descriptions still swarm in Italy, and in the countries of South America, lately subject to the Spanish and Portuguese crowns; in Spain and Portugal all monasteries have been suppressed within these few years. Even in modern times we still hear occasionally of the institution of a new order of monks. One, called the Congregation of the Blessed Virgin Mary, was established by the late Pope Leo XII. in 1826. But the most important new order of monks, founded in the Roman Catholic church since the first outbreak of the Reformation, is that of the Jesuists; for an account of which see vol. xiii., p. 110. [MONK.]

(Among the most important works on the subject of monachism are the following: 'Nebridii a Mundelheim Antiquarium Monasticum,' fol., Vien., 1650; 'Philippi Bonanni Ordinum Religiosorum Catalogus,' 3 vols. 4to., Rom. 1706-8; 'Histoire des Ordres Monastiques Religieux et Militaires,' par le Père Hippolyte Hélyot, Par., 8 vols. 4to., 1714, &c.; and nouv. edit., 1792; Cromo's 'Pragmat. Geschichte der vornehmsten Mönchsorden,' 10 vols. Leipz., 1774-83; Tanner's 'Notitia Monastica,' fol. 1744; Dugdale's 'Monasticon,' new edit. by Cayley and Ellis, 6 vols. fol., 1812-30; Fosbrooke's 'British Monachism,' 2 vols. 8vo., 1802. See also Thomasin, 'Discipline de l'Eglise,' tom. i.; Bingham's 'Antiquities of the Christian Church,' book vii.; and Gibbon's 'Dec. and Fall of Rom. Emp.,' chap. 37.)

MO'NACO, the Principality of, a small state in the Western Riviera of Genoa. It consists of the small towns of Monaco and Mentone and the village of Roccabruna, with a small territory about five miles in length along the coast, between Nizza and Ventimiglia, and extends inland about three miles. The country is rocky, being on the southern slope of the Maritime Alps, which here approach close to the sea. The town of Monaco is built on a steep naked rock rising above the sea-coast, is fortified, and has about 1000 inhabitants, and a harbour for small vessels. Mentone, farther to the east, lies on the sea-shore in a narrow strip of fertile land, sheltered by the mountains from the north winds, and planted with olive and lemon trees: it has a warm southern climate, and carries on some trade by sea. Mentone has about 4000 inhabitants; and a handsome church. Since the fourteenth century, this little principality has been in possession of the Genoese family of Grimaldi, under the protection of France and of the Genoese republic. The actual prince of Monaco, Onorato V., is a peer of France, and generally lives at Paris, but he acknowledges the king of Sardinia as his 'suzerain,' and the town of Monaco has a Sardinian garrison. He has a palace at Monaco and a handsome villa near Mentone. He draws from his little state a revenue of about 300,000 francs, 12,000*l.* sterling, of which less than one-half supplies the charges of the administration, and the rest is for the use of the prince. (Bertolotti, *Viaggio nella Liguria Marittima.*) The name of Monaco is derived from a temple dedicated to Hercules Monoecus, that is 'solitary,' which stood on the rock where the town now stands. Strabo (iv. 203) places it at the distance of 200 stadia from Antipolis, the modern Antibes.

MONAGHAN, a county in the province of Ulster in Ireland, bounded on the north by the county of Tyrone, from which, toward the north-east, it is separated by the river Blackwater; on the east by the county of Armagh, from which, in one part, it is separated by the river Fane; on the south-east by the county of Louth, on the south by that of Meath, and on the south-west by that of Cavan, from all three of which it is partly or entirely separated by the Lagan, a feeder of the Glyde; and on the west and north-west by the county of Fermanagh. The form of the county is that of an irregular quadrangle. Its greatest dimensions are the diagonals of the quadrangle; one from north by west to south by east, from the banks of the Blackwater to those of the Lagan, 37 miles; the other from west-north-west to east-south-east, from the neighbourhood of Clones to the neighbourhood of Inniskeen, on the Fane, 32 miles. The area of the county was given by Dr. Beaufort (*Memoir of a Map of Ireland*), in 1792, at 450 square English miles, or 288,000 English acres, and by Mr. Wakefield, in 1812 (*Account of Ireland, Statistical and Political*), at 509 square miles. In the Population Returns for 1831 the area is given, 'from the best authorities extant,' at 277,472 acres; in the 'Map of Ireland' published by the Society for the Diffusion of Useful Knowledge, at 313,682 English or statute acres; and in Lewis's 'Topographical Dictionary of Ireland,' from the Ordnance Survey, at 327,048 statute acres, of which 9236 are unimproved mountain and bog, 6167 under water, and the rest cultivated land. The county is one of the most densely peopled in Ireland, being surpassed only by the counties of Dublin, Armagh, and Down: by the census of 1831 there were 195,536 inhabitants. Monaghan, the assize-town, is situated in the northern part of the county, 68 English miles in a straight line north-north-west of Dublin, or 76 miles by the mail-road through Drogheda, Carrickmacross, and Castle Blayney, in 54° 15′ N. lat. and 6° 57′ or 58′ W. long.

Surface.—'The whole county is hilly, but the hills seem as if scattered in an irregular manner, without forming continued ridges or chains.' (Wakefield.) The principal heights are, Slieve Baugh or Slieve Beagh Mountains, in the north, which define in that part the basin of the Blackwater: and those in the east, which rise about the sources of the Fane, and are connected with the Fews Mountains of Armagh. (Beaufort's *Map.*) Mully Ash hill in this group is 1035 feet high. The Slieve Beagh Mountains form an uninteresting waste along the boundary of this county and Tyrone, and are sterile without being picturesque.

Geological Character.—In the southern part of the county is a small district, extending to Kingscourt in the county of Cavan, occupied by the new red sandstone or red marl. This formation contains a valuable deposit of gypsum, in which however no workings have yet been commenced for commercial purposes. Immediately adjacent to the red-marl district on the east is a small coal-field. Though many trials have been made to obtain coal, none has yet been found of sufficient value to defray the expense of working; but one bed of 14 inches, another of 12 inches, and several of inferior thickness, have been discovered. The coal-field rests on a small tract of carboniferous limestone, which crops out from beneath it on every side (except where the coal and red-marl districts are contiguous), and is itself insulated in the transition district of the east of Ulster. Carboniferous limestone appears again in that part of the county which lies north-west of a line drawn through Monaghan and Clones. The Slieve Beagh or Slieve Baugh Mountains in this part are composed of the rocks belonging to the Calp series of this formation. These rocks were long considered to belong to the true coal formation; and sanguine but fallacious hopes were long entertained of the discovery of workable beds of coal. This part of the county is comprehended in the great limestone district of the north and middle of Ireland. The yellow sandstone and sandstone conglomerate, which form the lowest members of the limestone series, appear in some places along the northern border.

The rest of the county is occupied by the rocks of the transition formation, which cover an extensive district in the east of Ulster and north of Leinster. These transition rocks consist of grauwacké slate, fissile clay-slate, flint slate, and chlorite slate, with hornblende slate, schistose porphyry, and other metamorphic rocks, where the transition and crystalline formations (granite, &c.) come in contact or approach near each other. Escars, or eskers, which are low steep ridges of alluvial matter, usually composed of clay and limestone gravel, are found in several parts of the county. Those near Tyhallon, not far from Monaghan, are composed entirely of jasper, quartz, agates, and argillaceous sand. (*Irish Railway Commissioners' Second Report*; Lewis, *Top. Dict.*)

Limestone of great variety and excellent quality is quarried; also fine marble, and valuable freestone for building. A fine white sandstone, dug in the Slieve Beagh Mountains, is extensively used for architectural purposes. Ironstone is found, but of inferior quality, and several quarries of slates or flagstones are worked. Lead-ore has been found, and considerable works were erected for smelting it, but they were afterwards abandoned. Some potters' clay is found, and brick earth in nearly all parts of the county. (Lewis's *Top. Dict.*)

Hydrography and Communications.—The northern part of the county belongs to the basin of the Blackwater, the southern to the basins of the Fane and the Glyde, and the western to the basin of the Erne. The Blackwater has about 10 or 12 miles of its course along the north-eastern boundary, and several streams which rise in the Slieve Beagh Mountains fall into it in this part. The Fane rises not far from Castle Blayney, and flows south-east, partly upon and partly within the border of the county, for 12 or 15 miles, before it enters the county of Louth, through which it flows into the Irish Sea. The Glyde rises in the south part of the county, and has a course parallel to the Fane; the Lagan, a feeder of the Glyde, and a much more considerable stream, has about 13 miles of its course along the southern boundary of the county. The Finn is the most important of the streams which flow into the Erne; it rises in the Slieve Beagh Mountains, and has about 20 miles of its course in this county. None of these rivers are navigable. There is one navigable canal, now in progress, the Ulster Canal, which is to unite Lough Neagh with Lough Erne. It commences in the river Blackwater at Charlemont, and crosses the county in a south-west direction near Monaghan and Clones. Its whole length, when finished, will be about 46 miles, of which about 20 will be in this county.

There are several loughs, but all of them small. The principal are, Muckno Lough, near Castle Blayney, in the eastern part of the county, and Inner Lough, on the south-west border, near Rockcorry. Muckno or Barrac Lough is of very irregular form, about 3 miles long from north-west to south-east, and in some parts about a mile wide: it contains a number of small islands. The river Fane runs through it. Lough Inner is about 3 miles long from east to west, exceedingly narrow throughout and of very irregular form. Lough Emy, near Emyvale, and Glas Lough, near the town of Glaslough, in the northern part of the county; Lough Leesborough, between Rockcorry and Newbliss, and Lough Long, near the village of Drum, in the western parts; the White Lough and Corfin Lough, near Ballybay, in the central parts; Lough Egish, or Eglish, Lough Avaghon, and Lough Bawn, near Ballytrain, in the southern part; Lough Ballyhoe (through which the Lagan runs), on the southern border of the county, and Lough Ross, on the eastern border, are next in size to Muckno and Inner.

The principal road is the mail-road from Dublin to Londonderry, which enters the county on the south-east side by two branches, and runs north-north-west through Carrickmacross (at or near which town the branches unite), Castle Blayney, Monaghan, and Emyvale, into the county of Tyrone. This is the only mail-road. A branch road runs from Carrickmacross by Ballybay, and rejoins the main line at Monaghan. Other roads lead from Carrickmacross to Dundalk, from Castle Blayney to Newry and to Armagh, and from Monaghan to Armagh, and by Clones to Cavan. A road from Dublin by Navan (Meath), Kingscourt, and Cootehill (Cavan), passes through Clones on the western side of the county, and joins the Londonderry mail-road at Omagh and Tyrone. The principal traffic is from the port of Dundalk (Louth), on the one hand, to Carrickmacross, and from thence to Shercock and Cootehill, in the county of Cavan; and on the other hand, to Castle Blayney and Monaghan: from the port of Newry (Down), on the one hand, by Castle Blayney, to Ballybay and Newbliss in this county, and to Shercock and Cootehill, in the county of Cavan; and on the other hand, by Newtown Hamilton (Armagh) to Monaghan: and from the port of Belfast (Antrim), by Armagh, to Monaghan, Clones, and Newbliss. The portion of road most frequented by travellers is that from Castle Blayney, where roads from Dublin, Dundalk, and Newry converge, to Monaghan.

Soil; Agriculture; Condition of the People.—The soil of the county varies much, and the variation is partly dependent on the character of the surface; the low lands being generally wet and moory, especially in the north-western parts near the Slieve Beagh Mountains. The central districts, comprehending the baronies of Monaghan, Cremorne, and Dartree or Dartry, are more fertile than any other part of the county; although the southern extremity consists of rich and productive land. The western side has a soil naturally wet, but capable of great improvement by manuring. (Lewis, *Top. Dict.*)

The following particulars from the Reports of the Commissioners for inquiring into the State of the Poor in Ireland' (*Parliamentary Papers for* 1836, vol. xxxiii.) have reference chiefly to the barony of Monaghan, but may be probably extended, without much variation, to the county at large. The soil of the barony is mostly a good loam, upon a firm subsoil of clay mixed with lime, gravel, or sand. In the elevated parts the soil is moory or peaty, with the subsoil frequently clayey. Lime, dung, clay, ashes, and peat are used for manure; lime is dug near Monaghan and Glaslough (barony of Trough)· marling is little practised, but burning the soil is common, though very injurious in most cases. The barony of Monaghan is altogether a tillage district, except some 'rough grazing' in the mountains, on which some young cattle are kept: there is no grazing-land in the district capable of fattening cattle. Sheep are so rare that the assistant commissioners did not see one in the barony, except in gentlemen's demesnes. The farms are too small to admit of keeping them with advantage, and the number has been gradually declining. The average size of farms is 8 to 10 acres; a few farmers, and but a few, in the barony hold over 50 and not exceeding 80 acres. The only persons holding above 80 acres are gentlemen who farm their own estates. The size of the farms has diminished with the increase of population; and though the consolidation of the small holdings has been an object of desire with the landowners, little has been done to bring it about, except the insertion in leases of clauses to prevent alienation and sub-letting. About a fourth or fifth of the farm is always left for grazing. Ejections have been resisted by the peasantry when they have taken place from any cause.

Almost the whole county belongs to absentees, and the estates are consequently managed by agents. Farms are not commonly held by lease, and tenancy at will is becoming more common; where leases are granted, they are commonly for one life or for 21 years, formerly they were granted for three lives or 31 years. Middlemen are very rare. The rent of tillage land ranges from 25*s.* to 30*s.* and 32*s.* 6*d.* per Irish acre (121 Irish = 196 English acres), and in some instances it is as high as 40*s.*

The usual rotation of crops on a small farm is, potatoes, wheat or barley, oats (sown with clover), clover, then potatoes again; another not unusual rotation is, potatoes, flax, wheat or barley, oats with clover. The wheat grown is generally red wheat, and it is of inferior quality; this is partly ascribed to its being grown after potatoes, instead of on a naked fallow; partly to the weeds which are allowed to grow up with it; and partly to the want of proper machines for winnowing and screening it. It is not uncommon to thrash in the field, and winnow it in the open air by means of wind alone. The grain is sold in Monaghan market in the bulk: the peasantry keep little of their own grain, some cannot even keep the seed. Flax is grown to a great extent in the county, and is most valuable as a source both of industry and profit, but it is not equal in quality to that of the county of Armagh.

Clover and vetches are grown in abundance, but few turnips or mangel wurzel. Green crops, especially clover, have been increasingly raised of late years. The potato crop is very uncertain; the ground is commonly prepared for it by burning it for manure; the kind of potato cultivated for the peasantry are 'caps,' which will grow on inferior ground and yield a plentiful return. There are few orchards; the farmers do not consider them profitable.

From the want of good pasturage, no cattle are fattened, except a few on the demesnes of the gentry. The cattle of the district are chiefly of the native Irish breed, of a reddish colour with a streak of white along the back. They are mostly brought from Connaught, and are turned out to graze on the mountains. Many of them are housed in winter, but those of the poorer farmers get little hay, only some straw, and the run of the stubble-ground. The breed of cattle has been much improved; the Devon, Durham, and Hereford breeds have been introduced, and a few Ayrshire cows. The native breed has been crossed in several instances with the imported stock. The price of cattle is declining.

The quantity of butter made has much increased from the increased intercourse with England; the supply at Monaghan has trebled of late years. It is chiefly taken to market there, but some of it is sent to Newry. It is considered to be injured in the making by the smoke of the

cabins, but increased pains have been taken with it, and it has been much improved. There is no cheese made.

The usual fences are loose stone walls, clay ditches, and some hedges of hawthorns and whins. There is much ground wasted in ditches and headlands.

The population of the county has been stated to be very dense; the number of labourers has increased, and the decline of the linen manufacture, which once furnished them with employment, has left the great majority with little other work than that which they bestow on the small spot of land which they occupy (for the con-acre system is generally prevalent), or such occasional occupation as they may receive. The daily wages of agricultural labourers are estimated, in the 'Appendix to the Third Report of the Commissioners for inquiring into the Condition of the Irish Poor' (*Appendix H.*, part 1, table iii.), at 10*d.* on the average of the year; and the average amount of work obtained by able bodied labourers is only about 180 days in the year, or little more than three days in the week. In this wretched condition they commonly marry early, and without making any provision. They usually pay their rent in work done for the farmer under whom they hold their con-acre and cabin. There is little employment for labourers' wives or children, except that the former earn the merest trifle by spinning, if they can spare the time, or a very few keep poultry; and the latter get a day's work now and then at weeding or looking after the cattle, for which they get about 3*d.* a day without diet, or from 10*s.* to 15*s.* for the summer season. The common food of the labourers is potatoes, which they prefer as constant food to bread or meal. They get a little milk or buttermilk, but very rarely. 'We think as much of a drink of buttermilk,' said a poor woman to the Commissioners,' as you gentlemen do of the finest breakfast.' Their habitations are wretched cabins, sometimes with one room, it may be of 12 feet square and of 7 or 8 feet high; sometimes of two. The floor is the bare ground, usually dug up and trampled to make it harder; and sometimes, but not often, lime is mingled in with it. The cottages or cabins are thatched with straw, and mostly have chimneys built with sticks and clay, with perhaps an old firkin stuck up as a chimney-pot. The windows are about a foot square, rarely glazed; the doors and shutters usually have iron hinges, latches, bolts, &c. The cottages are without privies, but some have wretched little places for keeping a pig. They are inferior to those in the counties of Armagh and Down. The common fuel is peat or turf, which is used by all classes of the community: if they have not sufficient turf, they make up the deficiency with bushes and brambles.

The peasantry are wretchedly off for clothing. Many of them and their children are obliged to stay away from prayers for want of clothes; they borrow from each other, and some go in the morning and some in the evening.

Few of the women make their own clothes, but since the failure of employment at spinning, they are becoming more skilful with the needle. There are few cottages which do not contain some sort of bedstead, but this frequently contains five or six people; and if the family is very large, some straw is shaken down for a portion of them. Pawning appears to be on the increase, and the people are becoming used to it. 'At first, some years ago,' said a witness to the Commissioners, 'we used to go in the dusk to the pawnbroker's, but now I wouldn't care if all the people on the market-cross saw me. They know it is mighty pressure makes us do it.' Drunkenness has much increased. Retail spirit-shops have been multiplied, and there are a number of shebeen-houses, or unlicensed spirit-shops, which, being in remote places and under no control, are the sources of great immorality. Almost all the cases which come before the magistrates arise out of drunken squabbles; and young people steal flax or potatoes or meal from their parents to pledge them for liquor at the shebeen-houses. The intoxicating liquor in almost exclusive use is whiskey; beer is very little used. The tradesmen about the town, and the farmers who attend the markets, are the chief drunkards; the extreme poverty of the labourers prevents them from drinking.

Emigration has been considerable during the last few years, principally to the United States of America and to the Canadas. A very few persons have gone to Van Diemen's Land or New South Wales. Many farmers have sold their farms and gone, also some tradesmen, and a few labourers; but the emigrants have chiefly been persons of a station in life above that of common labourers, and have emigrated at their own expense. Several of them have been Protestants, and persons of good character and enterprising spirit.

Divisions, Towns, &c.—The county of Monaghan is divided into five baronies, which, with their situation and population, are as follows:—

		Pop. 1831.
Cremorne	Central and E.	51,892
Dartree or Dartry	Central and W.	40,135
Farney	S.	41,561
Monaghan	Central.	42,728
Trough	N.	19,220
		195,536

It contains the corporate, assize, and market town of Monaghan, formerly a parliamentary borough; the market and post towns of Carrickmacross, Castle Blayney, Ballybay, Clones, and Newbliss; and the post towns of Emyvale and Glaslough. The principal villages are Ballytrain, Smithsborough, Tydavnet, Scotstown, Scotshouse, Drum, Rockcorry, and Magheracloone.

Monaghan is on the mail-road from Dublin to Londonderry: the distance from Dublin has been already given. The antient boundary of the borough is stated in general terms in the charter to consist of 'the town of Monaghan,' that is, as far as the mere buildings are understood to have extended at the date of the Charter (A.D. 1613); but there is a district extending in every direction about three-quarters of a mile round the town, known by the name of 'The Corporation,' and divided into ten parts or 'townlands.' (*Report of Commissioners of Municipal Boundaries.*) The town itself consists of an irregular assemblage of streets, the three principal of which meet in a square called the Diamond, in the centre of the town. There is another square on the south-east side of the town called Shamble-square. The town contained, in 1831, 540 houses, inhabited by 690 families, forming a population of 3848 persons: there were 16 houses building and 25 uninhabited. In the Reports of the Commissioners of Irish Poor, the number of houses is given at about 900 (*Answers of Rev. John Caulfield to Queries for Parishes in large Towns, Third Report, Appendix C,* part i.), of which about 376 were good houses, 300 middling, and the rest mere cabins. The difference in the number of houses in the two statements is owing probably to the larger space included by Mr. Caulfield under the term 'town.' The population had however much increased in the interval, chiefly from the unwillingness of landlords to allow cottiers on their estates. The rest of the parish contained, in 1831, 1499 houses, inhabited by 1554 families: there were 13 houses building and 82 uninhabited. The population was 8027; giving a total for the town and the rest of the parish of 2039 inhabited houses, 2244 families, and 11,875 persons.

The principal public buildings are the county court house, a handsome modern building in the centre of the town; the county infirmary on the east side of the town, on an open elevated site; the county gaol on the north side; and the diocesan school on the west. There is a large and handsome parish church lately erected in the Gothic style of architecture, two Presbyterian and two Methodist meeting-houses; one Roman Catholic chapel in the town, and two others in other parts of the parish. There are a market-house and a linen-hall. Some antient walls, near the Diamond-square, are said to be the relics of an old monastery built for conventual Franciscans on the site of a former religious house; from one or other of which establishments the town (and from it the county) took the name of Monaghan or Muinechan, 'the monks' town.' There is also an earthen mound marking the site of a castle or fort erected here early in the seventeenth century, by Sir Edward Blayney, who had the military command of the county.

Monaghan has no manufacture: its principal trade is in the agricultural produce of the surrounding districts, which is brought to market here; and in linen, for which it is a considerable mart. The market-days are Monday for linen and for pigs, of which great numbers are slaughtered and sent to Belfast to be cured for exportation; Tuesday for corn, except oats, for which there is a market on Wednesday; and Saturday for oats and potatoes. The corn and potato markets are held in Diamond-square; the meat market in Shamble-square. Considerable quantities of flax, yarn, butter, and provisions of all kinds are sold. There is a fair on the first Monday in each month. The Ulster canal,

when completed, will pass close to the town. The poor inhabitants are engaged in occasional labour about the town, but wages are very low, and the earnings of a labourer, if constantly employed, amount only to 8*l.* or 10*l.* in the year. The condition of the poor has been deteriorating for the last fifteen years: they subsist on potatoes, with sometimes a little milk. The tradesmen are better fed. There is a savings' bank, to which the principal contributors are farmers, tradesmen, and servants.

The corporation was created by a charter of 11 James I. (A.D. 1613), and consists of a provost, twelve free burgesses, and an indefinite number of freemen. The borough sent two members to the Irish parliament before the Union. Lord Rossmore, the patron, received 15,000*l.* as a compensation on its disfranchisement. The borough court of record has long fallen into disuse. The quarter-sessions for the division and the assizes for the county are held here; and there are petty sessions held by the county magistrates every week. The town is watched and lighted; and is the chief station of the county constabulary. The living is a rectory and vicarage, in the diocese of Clogher; the tithe composition rent is estimated at 553*l.* 16*s.* 11*d.* per annum; there is a glebe of 38 statute acres, valued at 114*l.* per annum, and a neat glebe-house. The Catholics form about two-thirds of the population. There are ten public schools, with about 1400 children; and seven private schools, in which are about 300 children. There are a dispensary, a mendicity society, and another society for the relief of the poor.

Carrickmacross is in the barony of Farney, in the south part of the county, 51 miles from Dublin on the Londonderry mail-road. It consists of one principal street along the road, and of several smaller streets or lanes leading from it. The number of houses in the town, in 1831, was 524 inhabited (by 555 families), 34 uninhabited, and 4 building; the population was 2979, one-fourth agricultural: the rest of the parish of Carrickmacross contained 1771 houses, inhabited by 1777 families; and 9621 inhabitants: together 2295 inhabited houses, and 12,600 inhabitants. Many of the houses are of respectable appearance. There is a church, a neat but small stone building, with a tower and spire; a Catholic chapel, and a Presbyterian meeting-house. There are two other Catholic chapels in different parts of the parish. Malting, brewing, and distilling are carried on in the town; coarse hats, soap, and candles are manufactured; and a considerable retail business is done. There are corn-markets on Wednesday and Saturday, and a general market on Thursday, at which many pigs are sold. There are quarries of freestone and limestone in the parish, and several lime-kilns near the town. A portion of the county constabulary is stationed here: there are a bridewell, a dispensary, and a mendicity society. There are two schools, one for boys and one for girls, connected with the Board of National Education, and nine other schools, in which the children are taught gratuitously; in these schools from 1400 to 1500 children are instructed. There are besides a number of private schools and hedge schools. The children on the roll of the two national schools amounted, by Mr. Carlile's statement in the Report of the Irish Education Board, July, 1837, to 538 boys and girls. There is a dispensary. The living is a vicarage, the gross yearly revenues of which are 646*l.* 3*s.* 1*d.* composition for tithe; and 252*l.* estimated value of the glebe, which comprehends above 181 statute acres. There is a glebe-house. The inhabitants are almost entirely Catholics.

Castle Blayney is in Muckno parish, in the barony of Cremorne, 62 miles from Dublin on the Londonderry mail-road. The town lies near the western shore of Lough Muckno, and comprehended in 1831, 307 houses, inhabited by 350 families, 2 houses building, and 32 unoccupied: the population was 1828, about one-fourth agricultural. The rest of the parish contained 1470 houses, inhabited by 1495 families, 3 houses building, and 89 uninhabited; with a population of 7888: the total population of the parish was 9716. The town derived its origin and name from a fort built here early in the seventeenth century by Sir Edward Blayney; and consists of three streets meeting in the market-place, in which is a good market-house. Many of the houses are built of stone, and are of respectable appearance. The parish church of Muckno, capable of holding 350 persons, is at Castle Blayney, and there is a Catholic chapel. The linen manufacture was flourishing here formerly. There is a market on Wednesday for yarn and flax, and a fair once a month for live stock; there are markets for corn and butter on Tuesday and Friday. Sessions for the division are held here in a neat sessions-house once a quarter; and petty sessions every fortnight; and a body of the county constabulary is stationed here. There is a small bridewell. The mansion and demesne of Castle Blayney, the seat of Lord Blayney, are near the town. There are a parochial school and a girls' school, supported by Lady Blayney. Besides the Catholic chapel at Castle Blayney, there is another at Orum in the parish, and at different places in the parish there are four meeting-houses for Presbyterians and one for Methodists. The Catholics form half the population, and the Presbyterians above a third. The living of Muckno is a rectory and vicarage, with a gross yearly revenue of nearly 475*l.*, above 436*l.* of which arises from tithe composition, the rest from a glebe of more than 32 statute acres. There is a glebe-house.

Ballybay, or Ballibay, is in Cremorne barony, 64 miles from Dublin, on a road branching from the Londonderry mail-road at Carrickmacross, and rejoining it at Monaghan. The town comprehended in 1831, 382 houses, inhabited by 384 families; and 19 houses uninhabited: the population was 1947: the remainder of the parish comprehended 781 houses, inhabited by 911 families, forming a population of 4738; or for the whole parish 6685: a small part of the parish extends into the barony of Monaghan. The town rose to importance through the linen manufacture, and now contains many respectable and comfortable houses. There are a market-house, a tolerably large church, a Catholic chapel-of-ease, and a handsome Presbyterian meeting-house. The linen manufacture is carried on, and there are markets on Saturday for butter and flax, and on Tuesday and Friday for grain, at all which much business is done. There is a monthly fair, at which large sales of cattle, horses, and pigs take place. Petty sessions are held at irregular intervals, and a party of the county constabulary is stationed in the town. There is a reading society with a library of 1000 volumes. There are in the parish a Catholic chapel (at Ballintrugh) and two Presbyterian meeting-houses, besides those in the town of Ballybay. The Catholics form not quite half of the population of the parish: the Presbyterians less than a third. There are a dispensary, four public schools, with about 260 children, and six hedge-schools, with about 200 children, beside two Sunday-schools.

Clones is in the barony of Dartree, in the western part of the county, 79 miles from Dublin through Navan (Meath) and Kingscourt and Cootehill (Cavan). The town contained in 1831, 386 houses, inhabited by 435 families; forming a population of 2381: there were 39 houses unoccupied and 4 building. The rest of the parish, which extends into Monaghan barony, and into the barony of Clonkelly in the county of Fermanagh, comprehended 3609 houses, inhabited by 3834 families, forming a population of 19,822, or with the town 22,203. Clones was, in antient times, nearly surrounded by water, and an abbey was founded early in the sixth century: from these circumstances the place obtained its name, Cluan Innis, 'the island of retreat:' from whence, by corruption, has been formed, first Cloanish or Clownish, and more recently Clones. The abbey continued till the dissolution under Henry VIII.: there are still some remains of the antient monastic buildings. The more modern houses in the town are slated; but the older ones are covered with thatch. The church was rebuilt in 1824, and is capable of holding 700 persons. There are a large Catholic chapel and a Wesleyan Methodist meeting-house. The market-place is of triangular form, and has in it a market-house, a pump, and an antient stone cross. There is a large brewery in the town; and in other parts of the parish are extensive iron-works for the manufacture of agricultural implements, and several flour-mills. Limestone and good freestone for building are quarried. A market is held weekly on Thursday for yarn and linen, and there are two monthly fairs, one in the town for pigs and live stock, and one at Rosslea, in that part of the parish which is in the county of Fermanagh. Petty sessions are held every fortnight, and a manorial court once a month for the recovery of small debts: a portion of the county constabulary is stationed in the town.

Beside the places of worship mentioned above, there are in the parish two chapels-of-ease, three Roman Catholic chapels, two Presbyterian meeting-houses, and one Wesleyan Methodist meeting-house. There are a number of schools in the parish, aided, if not wholly supported, by subscription, and affording instruction to about 1900 children.

Some of them are in connection with the National Board. Nearly 300 children are under instruction in private schools. There is a dispensary. The living is a rectory and vicarage, of the gross yearly value of 2000*l.* 6*s.* 8*d.*, of which 950*l.* arises from tithe composition, and the rest from a glebe of above 1242 statute acres. There is a glebe-house. By the Romish church the parish is divided into two districts, Clones East and Clones West; each part has two chapels. Near the ruins of the abbey is one of the antient round towers. The internal diameter is 10 feet; and there are resting-places for the joists of five floors. There is a doorway about 4 feet from the ground; and at the top of the tower are large embrasures. There is another round tower in the parish.

Newbliss is in Killeevan parish, in the barony of Dartree, about 5 miles from Clones. It is a small place, containing in 1831 only 85 houses, inhabited by 105 families, making up a population of 497; there were 9 houses unoccupied, and 1 building. The number of houses in the rest of the parish, which extends into the barony of Monaghan, was 1393, inhabited by 1538 families, making up a population of 7764; or, with the town, of 8261. The town consists of a single street of good width: the houses are of respectable appearance. The parish church of Killeevan is nearly midway between Newbliss and Clones: but there is a neat Presbyterian meeting-house in the town. There is a neat market house: the market is on Saturday, chiefly for pigs and flax; and there is a monthly fair, chiefly for pigs and live stock. There are in the town a dispensary and a school which is maintained by the London Hibernian Society. There are in other parts of the parish a Catholic chapel, six public and four private schools, in which (taken together) above 900 children are taught. The church and Catholic chapels are neat buildings. The living is a rectory and vicarage, with a gross yearly income of 653*l.* 5*s.* 5*d.*, of which 518*l.* 15*s.* 5*d.* is tithe composition; the rest arises from a glebe of about 110 acres: there is a glebe-house.

Emyvale is in the parish of Donagh, in the barony of Trough, in the northern part of the county; it is 91 miles from Dublin and 15 from Monaghan, on the Londonderry mail-road. It contained in 1831, 112 houses, inhabited by 122 families, beside 10 unoccupied, and 1 building: the population was 571. The town consists chiefly of one street, and is on the north bank of a small stream running into the Blackwater. On the bank of the stream is a large flour-mill, and in its bed is a quarry of greenstone. A body of the county constabulary is stationed here.

Glaslough, or Glasslough, is also in the parish of Donagh and barony of Trough, six or seven miles north-east of Monaghan. It is rather larger than Emyvale, containing, in 1831, 153 houses, inhabited by 168 families, and 5 unoccupied houses; the population was 812. The town is on the margin of a beautiful lake (Glas Lough, 'the green lake'), and contains a number of good houses roofed with slate. A large flour-mill, a mill for spinning flax, and a linen factory have been erected; and a weekly market on Friday for corn and flax established. There is a monthly fair for stock and agricultural produce. There is a dispensary. A castle and demesne, the residence of Mrs. Leslie, are near the town. The parish church of Donagh, built half a century ago, and capable of containing 400 persons, is in the town. The parish of Donagh is large, and has a gross population of 11,068. It has two Catholic chapels, a Presbyterian and a Wesleyan meeting-house. The benefice is a vicarage, with a gross yearly revenue of 221*l.*, viz. 150*l.* tithe composition, and the rest the produce of a glebe of above 71 acres.

The villages are all small. Ballytrain, or Bellatrain (in Aughnamullen parish, Cremorne barony), had, in 1831, 42 houses, inhabited by as many families, making a population of 220. It is the station of a body of the constabulary force, and has eight yearly fairs for cattle, sheep, and pigs. It has a small Catholic chapel and a dispensary. In the neighbourhood are several antient forts. Smithsborough owes its name to a person of the name of Smith, who established monthly fairs in the latter part of the last century. It is in Clones parish, and in the barony of Monaghan. In 1831 it had 48 houses, inhabited by 50 families, making a population of 244. There is a Presbyterian meeting-house, a school, and a dispensary. All the fairs except one in the year have been given up. There is a body of the constabulary stationed here. Tydavnet, or Todavnet, and Scotstown, are in the parish of Tydavnet, in the barony of Monaghan; both are stations of the constabulary, and Scotstown has a dispensary. Tydavnet has five yearly fairs, and Scotstown one every month. Scotshouse is in the parish of Currin, in the barony of Dartree. The parish church, capable of holding 400 persons, is in the village; and a body of the county constabulary is posted there. Drum is also in Currin parish, and in the barony of Dartree. It is near a small lake, Lough Long. It has a monthly fair, a small chapel-of-ease, two Presbyterian meeting-houses, a school, and a dispensary. The population in and about Drum contains a larger proportion than usual of members of the Established church. Rockcorry, though classed by our authorities among villages, is really a small market-town; it consists of a wide street, with a neat market-house, and has many houses of respectable appearance. It has a market on Wednesday, and a monthly fair. Petty-sessions are held every fortnight, and a party of police is stationed here. There are neat meeting-houses for Presbyterians and Wesleyan Methodists; and there are an infant-school, a sewing-school, and a dispensary. Magheracloone, or Magheracloony, is in the barony of Farney, a short distance from Carrickmacross. It has a neat modern church.

Divisions for Ecclesiastical and Legal Purposes.—The county is wholly included in the diocese of Clogher, and contains the whole or part of twenty-three parishes, of which only two are united so as to form one benefice. Of the twenty-two benefices, fourteen are rectories and vicarages united, two rectories, and six vicarages. With respect to value, one is of 2000*l.* a year, one 1015*l.*, one 969*l.*, two from 800*l.* to 900*l.*, one 744*l.*, four of from 600*l.* to 700*l.*, one of 551*l.*, six of from 400*l.* to 500*l.*, two of from 300*l.* to 400*l.*, two of from 200*l.* to 300*l.*, and one of 118*l.* There are twenty-two parish-churches and five chapels-of-ease. The churches are smaller than the generality of English churches; one of them (at Monaghan) is however capable of containing 1100 persons: many of them have been erected within the last twenty years. Divine service is commonly performed twice on the Sunday, beside services on holidays. In winter the second service is sometimes discontinued. The consistorial court of the diocese of Clogher is held at Monaghan, where is also the diocesan school.

In the territorial arrangements of the Catholic church the county is included in the Catholic diocese of Clogher, the bishop of which has the cure of the parish of Carrickmacross. There are forty-six Catholic chapels, and twenty-four meeting-houses for Presbyterians (of various classes) and eight for Methodists. The population of the parishes which are wholly or partly in this county is about 208,000, which may be thus distributed: belonging to the Established church 32,000, Catholics 151,000, Presbyterians or other Protestant dissenters 25,000. (*Reports of Commissioners of Public Instruction.*)

For judicial purposes the county is included in the north-east circuit, which comprehends the eastern part of Ulster. The county court-house and county-gaol are at Monaghan, where the assizes are held. Quarter-sessions are held at Monaghan and at Castle Blayney. Petty sessions are held at Monaghan, Clones, Castle Blayney, Ballybay, and Rockcorry. There are bridewells at Castle Blayney and Carrickmacross. The county-gaol is well managed; its good order, economy, and regularity are highly creditable to those who direct it; and there is sufficient accommodation in cells and day-rooms for all the purposes of classification and discipline. The prisoners are all employed, chiefly at stone-breaking; and there is a tread-wheel for those who are sentenced to hard labour. There is an excellent school, and the females are attended to under a qualified matron. The bridewells are small, but clean and orderly, and the management of them is conducted with the greatest regularity. (*Reports of Inspectors of Prisons.—Fifteenth Report.*) The number of persons committed for trial or bailed, in 1836, was 360; of these 158 were for crimes against the person; 27 for housebreaking or other offences against property committed with violence; 63 for offences against property without violence; 50 for malicious offences against property, 2 for uttering base coin, and 60 for other offences. Of the whole number, 288 were convicted, and 72 acquitted or discharged. No execution took place in the year. Of those committed or bailed, 302 were males (14 under sixteen years), and 58 females (1 under sixteen years); 156 could read and write, 110 could read only, and 88 could neither read nor write. The proportion of the number of offenders to the whole population

of the county is considerably below the average of Ireland, but above the average of the province of Ulster.

The number of the constabulary force in employment on the 1st of January, 1836, was 4 chief constables or sub-inspectors of the first class, 20 constables, and 116 sub-constables, with 6 horses. The expense of this force for the year 1835 was 5110*l.* 17*s.* 1*d.*, of which 2411*l.* 9*s.* 11*d.* was chargeable against the county. The amount of grand-jury presentments, in 1835, was 17,071*l.* 8*s.* 2*d.*, viz. 810*l.* 1*s.* 3*d.* for new roads, bridges, &c., 7045*l.* 17*s.* 0¼*d.* for repairing roads, bridges, &c., 1535*l.* 5*s.* 9¼*d.* prisons, 2537*l.* 10*s.* 3½*d.* police establishment, 2367*l.* 15*s.* 5½*d.* salaries of county officers, 1676*l.* 16*s.* 2¼*d.* repayment of government advances, 465*l.* 19*s.* 7*d.* public charities, &c., 632*l.* 2*s.* 6¼*d.* miscellaneous expenses.

The county is in the district of the Armagh Lunatic Asylum. The county infirmary or hospital is at Monaghan, and there are dispensaries at Ballytrain, Farney, Scotstown, Castleshane, Smithsborough, Ballybay, Clones, Newbliss, Drum, Rockcorry, Monaghan, Carrickmacross, and Glaslough. There were, according to the Return of the Rev. James Carlile (May 3, 1837), in the county 43 schools in connection with the National Board of Education, on the roll of which were 5464 scholars, in attendance 3406; of those whose religious sentiments (or those of their friends) were known, 484 were Protestants and 1689 Catholics.

History and Antiquities.—In the invasion of Ireland by the Anglo-Normans, Henry II., having bestowed all Ulster on John de Courcy when he could conquer it, that chieftain overran various parts (A.D. 1177), and built castles to secure his conquests. Among others he built two in the district now the barony of Farney in this county,* and gave them in charge to Macmahon, an Irish chieftain, who had ingratiated himself with him. MacMahon demolished these castles, upon which De Courcy made an inroad into the territory of the chieftain, and drove away a great number of cattle. He was followed and defeated by the natives, who had assembled to the number of 11,000; but in the course of the following night, availing himself of their careless security, he defeated them in turn with fearful slaughter, and secured his booty.

The English dominion in this part of Ireland was very imperfect. In the reign of Henry IV. we find that the district of Ferney was still held by a chieftain of the race of MacMahon, to whom Thomas of Lancaster, son of Henry, granted or confirmed it at a certain rent. The English retained however a castle in the district.

In the reign of Henry V. the MacMahons seem to have risen in arms, for they are noticed among the septs whom Talbot, Lord Furnival, the lord-lieutenant, brought into the king's peace. All he was able to do appears to have been to prevent open rebellion, without extending or strengthening the authority of the English government. Little is known of the subsequent condition of the district, or the events that occurred in it, until the reign of Elizabeth, under whom great progress was made in reducing the country to more complete subjection. In the year 1568 the Irish parliament assembled at Dublin passed an act for dividing into shires that part of the kingdom which had not yet been so arranged, and Monaghan was one of the shires constituted at this time. The country however still remained in an unsettled state, for Sir Henry Sidney, when lord-deputy for the last time, received the submission of MacMahon (A.D. 1575 or 1576). But shortly after, on occasion of a murder committed by MacMahon, the lord-deputy 'marched into MacMahon's country, and burned and otherwise destroyed it.' In 1584 MacMahon again 'submitted' to the lord-deputy, Sir John Perrot, who either divided Ulster into counties, or rendered effectual the division which had been before made, and placed sheriffs, justices of the peace, and other officers in them. The proprietorship of the county still remained in the hands of the chieftain of the MacMahons; but on a charge, true or false, of raising forces to exact the payment of the rents due to him, Hugh Roe MacMahon was tried, and executed at the town of Monaghan (A.D. 1589) by the lord-deputy, Sir William Fitzwilliams, and his lands bestowed on some of his kinsmen and other persons, to hold under a yearly rent. In the troubles excited in following years by the earl of Tyrone, the county was the scene of hostilities, and a portion of the MacMahons appear to have joined Tyrone. The English had a fort at Monaghan. In the settlement of Ulster (A.D. 1608), on the forfeiture of the estates of such as had been engaged in the rebellion of Sir Cahir O'Doherty, Monaghan does not appear to have been included, though the adjacent counties were. The corporation of Monaghan was however one of those erected about this time to strengthen the Protestant and English interests.

In the great rebellion of 1641 Monaghan was one of the counties that early came into the power of the insurgents, and in the course of the subsequent struggle was included in the seat of war; but no events of particular interest occurred within it. In the war of the Revolution of 1688 a sharp conflict took place at Glaslough, in which the Protestants were victorious, though with the loss of their leader, Mr. Anketel, a gentleman of property in the neighbourhood. In the rebellion of 1798 the county appears to have been scarcely if at all disturbed.

(Beaufort's *Map of Ireland and Memoir*; *Second Report of the Irish Railway Commissioners*; *Reports of Commissioners for Inquiring into the state of the Poor in Ireland*; *and other Parliamentary Papers*; Lewis's *Topographical Dictionary of Ireland*; Wakefield's *Account of Ireland*; Cox's *History of Ireland*.)

MONARCHY, from the Greek μοναρχία, a word compounded of μόνος, 'alone,' and the element ἄρχω, 'govern,' and signifying the 'government of a single person.' The word *monarchy* is properly applied to the government of a political community in which one person exercises the sovereign power. [SOVEREIGNTY.] In such cases, and in such cases alone, the government is properly styled a monarchy, and the supreme ruler is properly styled a monarch. Examples of monarchy, properly so called, are afforded by many Oriental governments, both in antient and modern times, by the governments of France and Spain in the last century, and the existing governments of Russia, Austria, and the several states of Italy.

But since monarchs have in many cases borne the honorary title of βασιλεύς,* *rex*, *re*, *roi*, *könig*, or *king*, and since persons so styled have, in many states not monarchical, held the highest rank in the government, and derived that rank by inheritance, governments presided over by a person bearing one of the titles just mentioned have usually been called *monarchies*.

The name *monarchy* is however incorrectly applied to a government, unless the king (or person bearing the equivalent title) possesses the entire sovereign power; as was the case with the king of Persia (whom the Greeks called 'the great king,' or simply 'the king'), and in more recent times with King Louis XIV., called by his contemporaries the *Grand Monarque*.

Now a king does not necessarily possess the entire sovereign power; in other words, he is not necessarily a monarch. Thus the king has shared the sovereign power either with a class of nobles, as in the early Greek states (Müller's *Dorians*, b. iii., c. 1), or with a popular body, as in the Roman kingdom, in the feudal kingdoms of the middle ages, and in modern England, France, Holland, and Belgium. The appellation of *monarch* properly implies the possession of the entire sovereign power by the person to whom it is affixed. The title of *king*, on the other hand, does not imply that the king possesses the entire sovereign power. In a state where the king once was a monarch, the kingly office may cease to confer the undivided sovereignty; and it may even dwindle into complete insignificance, and become a merely honorary dignity, as was the case with the ἄρχων βασιλεὺς at Athens, and the *rex sacrificulus* at Rome. (Creuzer's *Abriss der Römischen Antiquitäten*, § 133.)

In Sparta there was a *double* line of hereditary kings, who shared the sovereign power with some other magistrates and an assembly of citizens. The government of Sparta has usually been termed a republic, but some antient writers have called it monarchical, on account of its kings; and Polybius applies the same epithet to the Roman republic, on account of its two consuls. (*Philological Museum*, vol. ii., p. 49, 57.)

States which were at one time governed by kings possessing the entire sovereign power, and in which the king has subsequently been compelled to share the sovereign power with a popular body, are usually styled *mixed monarchies* or *limited monarchies*. These expressions mean that the

* It is not to be assumed that the limits of the antient district and the modern barony exactly coincided.

* On the correspondence of βασιλεὺς and *rex*, see Gibbon's 'Decline and Fall,' c. 49 (vol. vi., p. [illegible]); and on the etymology of *könig* and *king*, see Donaldson's 'New Cratylus,' p. 417.

person invested with the kingly office, having once been a monarch, is so no longer; and they may be compared with such expressions as *νᾶες, ἄναες*, which occur in the Greek poets.

Governments are divided into *monarchies* and *republics*; and therefore all governments which are not monarchies are republics. As we have already stated, a monarchy is a government in which one person possesses the entire sovereign power; and consequently a republic is a government in which the sovereign power is shared between several persons. [REPUBLIC.] These definitions of *monarchy* and *republic* however do not agree with existing usage; according to which, the popular though royal governments of England and France, for example, are monarchies (viz. *mixed* or *limited* monarchies), not republics.

The popular usage of the terms in question, to which we have adverted, is mainly owing to three causes. 1. Kings not possessing the entire sovereign power have in many cases succeeded kings who did possess the entire sovereign power; in other words, kings not monarchs have in many cases succeeded kings who were monarchs. 2. Both in royal monarchies and in royal republics, the crown or regal title usually descends by inheritance. 3. Kings who are not monarchs usually affect the state of monarchs properly so called; they intermarry only with persons of monarchical or royal blood, and refuse to intermarry with persons of an inferior degree.

Governments such as those of England and France are included by popular usage, together with republics, in the term 'free or constitutional governments,' as distinguished from pure monarchies, absolute monarchies, or despotisms.

According to the existing phraseology therefore, the use of the two terms in question is as follows:—

Monarchies are of two sorts, viz. *first*, pure, absolute, or unlimited monarchies, that is, monarchies properly so called; and, *secondly*, limited, mixed, or constitutional monarchies, or monarchies improperly so called, that is, republics presided over by a king, or kingly governments where the king is not sovereign.

Republics are states in which several persons share the sovereign power, and in which the person at the head of the governing body does not bear the title of king. Accordingly, Holland with a stadtholder, Venice with a doge, and England with a protector, are called republics, not monarchies. If the head of the Venetian aristocracy had been styled king instead of doge, and if his office had descended by inheritance instead of being conferred by election, Venice would have been called a monarchy, and not a republic. The only exception to this usage of which we are aware occurs in the case of Sparta, which is commonly called a republic, and not a monarchy, although it had hereditary kings. The reason of this exception probably is, that there being *two* lines of kings at Sparta, it was thought too gross an inaccuracy to call its government monarchical; though its government would have been called monarchical, if there had been only one king, in spite of the narrow powers which that king might have possessed.

The comparative advantages of a popular or republican government and of a monarchical government have been stated, with greater or less completeness and candour, by many writers. The best statement of the advantages of monarchy (properly so called), with which we are acquainted, is in Hobbes's 'Leviathan,' part ii., c. 19.

MONAS. [MICROZOARIA.]

MONASSA, Vieillot's name for a genus of Birds (Hermit Birds of Swainson and others). [KINGFISHERS, vol. xiii., p. 227.]

MONASTEREVEN. [KILDARE.]

MONASTERY. [MONACHISM; MONK.]

MONBODDO, JAMES BURNETT, styled LORD (in his quality of one of the judges of the Court of Session), was born in 1714, at the family seat of Monboddo, in Kincardineshire, and after studying at Aberdeen, was sent to the university of Groningen, according to a custom then common in Scotland, where an education either at a Dutch or French university was considered indispensable for young men intended either for the profession of law or for that of physic. Lord Monboddo has himself mentioned that his father, whose eldest son he was, sold part of his estate in order to afford him this advantage. He returned home in 1738, and from that time practised as an advocate at the Scottish bar, till his elevation to the bench in 1767. He is known in the literary world by two learned but paradoxical works: the first entitled 'A Dissertation on the Origin and Progress of Language,' in 6 vols. 8vo., 1774-92; the second entitled 'Antient Metaphysics,' in 6 vols. 4to., 1778, &c. An exclusive and somewhat intolerant admiration of the language, literature, and philosophy of the antient Greeks, some singular notions about men being only a civilised species of monkeys, a preference for the virtues and happiness of the savage state, and a general credulity in favour of the marvellous, are, in addition to very considerable erudition, among the most remarkable peculiarities of these performances. Lord Monboddo however was also esteemed a good lawyer and judge, and his character in all other relations was of the highest respectability. A description of his person and conversation has been given by Boswell in his 'Tour to the Hebrides,' in an account of a visit paid to him by Dr. Johnson at Monboddo (pp. 73-85). In a note Boswell says, 'There were several points of similarity between them; learning, clearness of head, precision of speech, and a love of research on many subjects which people in general do not investigate. Foote paid Lord Monboddo the compliment of saying that he was an Elzevir edition of Johnson.' Some further account of him may be found in Kerr's 'Memoirs of Smellie' the Edinburgh printer (vol. i., pp. 409-415). Smellie, we are told, used to be a frequent visitor at what his lordship called his *learned suppers*. 'In imitation of the antients,' says Smellie's biographer, 'for whom he professed an enthusiastic admiration, Lord Monboddo always made supper his principal meal, and his regular time of entertaining his friends. These learned suppers used to take place once a fortnight during the sitting of the courts; and among the usual guests were the late Dr. Black, Dr. Hutton, Dr. Hope, Dr. Walker, Mr. Smellie, and other men of science and learning, of whom Edinburgh at that time furnished an ample store.' Lord Monboddo died at Edinburgh, in consequence of a paralytic stroke, on the 26th of May, 1799.

MONDE'GO, River. [PORTUGAL.]

MONDOVI', a province of the Sardinian territories, on the north side of the Ligurian Apennines, which separate it from the Western Riviera of Genoa, is bounded on the east by the province of Acqui, on the west by that of Cuneo, and on the north by the provinces of Saluzzo and Alba. The province of Mondovi consists mainly of the basin of the Upper Tanaro, which river has its source near Ormea, at the foot of the Ligurian Apennines, and flows northward by Ceva; it receives the Ellero and Pesio on its left bank, and further down the Stura, which comes from Coni; the Tanaro then enters the province of Alba, and continues its course towards the Po. The length of the province of Mondovi, from south to north, from the source of the Tanaro to Cherasco, which is at the confluence of the Stura and the Tanaro, is near 40 miles; and its breadth, from the ridge of hills which divide the valley of the Tanaro from that of the Bormida, or province of Acqui, to the limits of the province of Coni, is about 15 miles. The population of the province is stated by Serristori (*Saggio Statistico*) at 118,000. The principal towns are—1. Mondovi, built partly on the bank of the river Ellero, an affluent of the Tanaro, and partly on a hill which rises above it: it is surrounded by walls, has a strong castle, several churches and convents, and 15,700 inhabitants. (*Calendario Sardo.*) Mondovi is a bishop's see, has a clerical seminary and a royal college, and manufactories of silks, woollens, cottons, paper, and hats. The country around is rich in corn, vines, mulberry-trees, and cattle. 2. Cherasco, a regularly built town, at the confluence of the Stura and the Tanaro, a fortified town with a castle, has several churches and convents, a college, two hospitals, and 8300 inhabitants. Silk is the principal produce of its territory. Cherasco has some fine buildings, such as the town-house, the palace of the noble family Salmatoris, and that of Gotti. Several of the churches and private houses are adorned with paintings by Taricco, a native artist. The district of Cherasco is well known for its white truffles, which are reckoned the best in Piedmont, a country renowned for truffles. 3. Ceva, at the foot of the Apennines, has a castle, two churches, a college, silk manufactories and iron-forges, and 3500 inhabitants. 4. Garessio, near the sources of the Tanaro, has 5300 inhabitants. 5. Bene, on the road from Mondovi to Cherasco, has a castle, some good buildings, and 3000 inhabitants. 6. Dogliani, on the road from Ceva to Cherasco, with a college and 4000 inhabitants.

It was by Mondovi and the valley of the Tanaro that Bonaparte first penetrated into Italy, in April, 1796.

MONEY is metal coined for the purposes of commerce, usually stamped with the name and arms of the prince or state that directs it to pass current. In a more enlarged sense, money means any representation of property, whether as coin or in the form of paper—the circulating medium. For money in this latter sense, and for our monetary system, the reader may refer to the articles BANK; BILL OF EXCHANGE; CURRENCY; EXCHANGE; and INTEREST.

The earliest currency of metal has been already treated of under COIN, together with the denominations, as far as they are known, of the different moneys current among the chief nations of antiquity, as well as in our own country. In the latter a more particular account of one or two coins was omitted; the FARTHING for instance, and the GUINEA, both of which have been referred to the present article.

Although FARTHINGS are asserted to have been round coins in the time of some of the later Saxon kings, they usually at that period consisted of the fractions or parts of the penny broken into four. Instances of pennies neatly and accurately cut into halves and quarters occur almost wherever Saxon coins have been discovered. The feorthling, or fourthling, as money, is twice mentioned in the Anglo-Saxon version of the gospels (*Matt.* v. 26; *Luke* xxi. 2).

GUINEA. The unite, as it was called, or twenty-shilling piece, was first coined by King James I. It was continued under King Charles I., and under Cromwell. Snelling (*View of the Gold Coin and Coinage of England*, p. 29), speaking of Charles II.'s coinage of 1662, says, the term twenty-shilling piece is still kept in the indentures; the appellation of *Guinea*, given to it, was because great quantities of them were coined out of gold brought from the Guinea coast by the Royal African Company, which are distinguished by an elephant under the head, some a castle, others without, which was continued under each reign until George I., though but a few are to be seen thus marked, either of him or of Queen Anne. The guinea of Charles II. had not been long in currency before common consent had raised it to twenty-one shillings. About the æra of the Revolution, James II.'s guinea was paid and received at twenty-one shillings and sixpence. In the reign immediately subsequent, the gold money remaining without alteration in weight and fineness, and the silver money growing daily of less value by clipping and counterfeiting, occasioned twenty-five shillings, then twenty-eight shillings, and at last thirty shillings to be given for a guinea; but no sooner was the silver money restored to its first value by the grand recoinage, than the guinea was again reduced, first to twenty-eight shillings, then to twenty-six, and finally to twenty-two shillings, and soon after by common consent was paid and remained as before at 21*s.* 6*d.*, and continued at that price for twenty years after. In 1717 the guinea was reduced to twenty-one shillings, at which it continued till the latter part of the reign of George III., when the coining of guineas ceased, and twenty-shilling pieces were again coined under the name of sovereigns.

Several other coins, ancient and modern, have been already disposed of under ANGEL; AS; AUREUS; BEZANT; BILLON; CROWNS OF THE SUN; DARIC; DENARIUS; DENIER; DRACHMA; LIVRE; and LOUIS D'OR.

We shall now lay before our readers as concise an account as possible of the money which forms the present or has formed the recently existing metallic currency of modern nations, taking them alphabetically:—

Abassi, or *Abassee*, a Persian coin of the value of 5½*d.*

Abuguelp, or *Albuguelp*, see *Griscio*.

Albert's Dollar is a coin known in Holland, with its half and quarter, at 50, 35, and 12½ stivers. The term is used also as a money of account at Libau and Riga. The intrinsic value of a metallic Albert's Dollar is 4*s.* 4½*d.*

Albus, a small coin and money of account, at Cassel, Cologne, and other places in Germany; the value of the albus was less than ½*d.*

Altmichlic, a Turkish silver coin of 60 paras, value 3*s.*

Asper, a very small Turkish coin and money of account. 120 aspers = 1 piastre.

August d'Or, a gold coin of Saxony, double, single, and half; reckoned at 10, 5, and 2½ rix-dollars. The august of 1754 was worth 16*s.* 2*d.*; that of 1784, 16*s.* 3½*d.*

Bagattino, a Venetian copper coin, a half soldo.

Bajoccho, or *Soldo*, a copper coin at Rome, Bologna, &c., divided into 12 denarii, or 5 quattrini; worth a trifle more than a halfpenny; there are also double and single bajocchelli, at 4 and 2 bajocchi.

Bajoire, a silver coin of Switzerland, of 3 livres 15 sols current.

Barbone, a silver coin in Lucca, of 12 soldi, half and quarter in proportion. The barbone is worth rather more than 4*d.*

Basarucco, a small tin coin current at Goa on the Malabar coast. These are called bad basaruccos; there are others called good ones, of copper; all the coins of Goa are of the same two descriptions and denominations.

Batzen, a base silver coin in Switzerland, and also in some parts of Germany, as at Augsburg. At Basle, a good batzen is 4 creutzers; a Swiss batzen, 2 sous, or 3¾ creutzers. Each batzen contains 10 rappen. Silver pieces of 40 and 20 batzen, and base silver pieces of 10 and 5 batzen, were published under the Helvetic republic between 1798 and 1803. The Swiss batzen is nearly 1½*d.* English.

Bendiky, a gold coin of Marocco, of the value of 9*s.*

Beslick, a Turkish silver coin worth about 3*s.* 2½*d.*

Bit, or *Bitt*, a small coin in the West Indies, worth 5½*d.*

Blaffert, a small coin at Cologne, worth 4 albuses.

Blankeel, or *Blanquello*, a small coin and money of account in Marocco. It is worth about 1*d.*

Bolognino, a copper coin at Bologna and its neighbourhood, the same with the bajoccho.

Borbi, or *Burbi*, a coin in Egypt, of copper, eight of which go to a medino. Borbies are also current at Tunis.

Borjookes, the name for the glass-beads which pass as small money in Abyssinia.

Cagliareso, a copper coin in Sardinia.

Cahaun, see *Cowries*.

Carlino, a small coin and money of account in the kingdom of Naples and in Sicily: it contains 10 grani, worth 4½*d.* In Piedmont the carlino is a gold coin; coined before 1785 it was of the assayed value of 5*l.* 18*s.* 8*d.*; subsequent to that year, 5*l.* 12*s.* 3*d.* The half, &c. in proportion.

Carolin d'Or, or simply *Carolin*, a gold coin of Bavaria, Hesse-Darmstadt, and Wirtemberg, value 20*s.* 4½*d.*

Cash, a small coin in China, and India beyond the Ganges. It is the only coin used in China. It is not coined but cast. It is composed of 6 parts of copper and 4 of lead; round, marked on one side, and rather raised at the edges, with a square hole in the middle. These pieces are commonly carried like beads on a string or wire. A tale in account of fine silver should be worth 1000 cash, or about 6*s.* 8*d.*; but on account of their convenience for common use, their price is sometimes so much raised that only 750 cash are given for the tale. Cash is sometimes called *Caxa*. In Sumatra cash are small pieces of tin or lead, 2500 of which go to a mace.

Cent, or *Centime*, a money of account in the new system of France, and a coin in the United States of North America. In France the centime is the hundredth part of the franc. In the money of the United States the cent is the hundredth part of a dollar, and contains 208 grains of copper. Half cents are coined in the same proportion.

Chayé, a small silver coin of Persia, of the value of 2½*d.*

Commassee, a small copper coin, containing a little silver, made use of at Betelfagui, or Betlefackee, in Arabia.

Copang, or *Coban*. The old copangs weigh 371 Dutch asen, or 275 English grains, and the gold is said to be 22 carats fine; this would give 2*l.* 4*s.* 7*d.* sterling for the value of the old copang; but it must be observed that the Japanese coins are reckoned at Madras only 87 touch, which is 20⅞ carats, and this reduces the value of the old copang to 2*l.* 1*s.* 10*d.* sterling. The new copangs weigh 180 English grains, and the gold is about 16 carats fine, which gives their value 21*s.* 3*d.* sterling.

Copeck, see *Kopek*.

Coronilla, or *Veinten de Oro*, a Spanish coin of gold, of the value of 4*s.* 0½*d.*

Cowries. Kelly, under 'Calcutta in Bengal,' says, 'Accounts are sometimes kept in the inferior departments of business in cowries, a species of small sea-shells, which, as long as they remain unbroken, are used as money in small payments; and 2560 cowries are generally reckoned for a current rupee; but they have intermediate divisions, thus 4 cowries make 1 gunda; 20 gundas, 1 punn; 4 punns, 1 anna; 4 annas, 1 cahaun; and 4 cahauns, 1 current rupee; but the last proportion is variable. Cowries are also used for money at Scindy on the Malabar coast, at Siam on the farther peninsula, and in Guinea, where 2000 of these shells are called a macuta.

Coz, a small Persian coin, in copper· 10 cozbaugues or coz make a shahee.

Crazia, a small silver coin in Tuscany.

Crimbal, a small coin in the West India Islands, called also *Isle du Vent Bits*, which pass for 7½d. currency.

Crown. In England, Henry VIII. was the first king who coined a crown in gold. He afterwards, as has been already noticed, struck some patterns for a crown in silver; but Edward VI. was the first who coined the silver crown and half-crown for currency. From Elizabeth to William IV. the silver crown and half-crown have been struck in every reign. The croone, or crown, was formerly a coin of the Netherlands; those after 1755 were estimated at 2 florins 14 stivers of exchange, or 3 florins 3 stivers current. It was also a coin of Denmark; double, single, and half-crowns were reckoned at 8, 4, and 2 marks crown money, or 8 marks 8 skillings, 4 marks 4 skillings, and 2 marks 2 skillings current.

Crusado, a coin in Portugal, both in gold and silver. Of the gold crusados there are two kinds, the old crusado coined at 400 rees, the new crusado at 480 rees; the silver crusado, also of 480 rees, has its half, quarter, and eighth. The value of the old crusado was 2*s.* 5*d.*; of the new, both gold and silver, 2*s.* 7*d.*

Daalder, a Dutch silver coin, or 30-stiver piece, worth in sterling 2*s.* 6½*d.*

Daezajie, a silver coin of Persia, of the value of 5 mamoodis, worth about 15*d.*

Decime, a money of account and coin in the Revolutionary system of France. Ten decimes make the franc, or 100 centimes. Copper pieces of one and two decimes are still current.

Denaro, a money of account in most parts of Italy.

Denier. [DENIER.] It was the 240th part of the livre, or French pound.

Denushka, a Russian copper coin, half a kopek.

Dime, a money of account and silver coin in America, is the tenth part of a dollar. There are also half dimes; both coined in 1796, worth 5¼*d.* and 2⅝*d.*

Dittobolo, a copper coin in the Ionian Islands, the double of the obolo or cent. The cent is worth ½*d.* nearly.

Diwani, or *Para*, a money of Abyssinia.

Dobra, or *Dobraon*, a Portuguese gold coin. Kelly says the old dobra coined before 1722 at 20,000 rees has since become worth 24,000; the dobra struck since 1722 is of 12,800 rees. There is also a half-dobra of 6400 rees, likewise called a Joanese. The sterling value of the later dobra, according to the mint price of gold in England at 3*l.* 17*s.* 10½*d.* per ounce, is 3*l.* 11*s.* 0¾*d.*

Dog, a small coin of 1½*d.* Leeward currency, used in the French West India Islands, called also the noir.

Doit, or *Duyt*, a small Dutch copper coin, the eighth part of a stiver, in value half a farthing.

Dollar. The dollar of the United States of North America, weighing 416 grains of standard silver, is valued at 4*s.* 4*d.* English. It has on the edge 'ONE DOLLAR OR UNIT HUNDRED CENTS:' and has its divisions of half and quarter. By an act of 1837 the silver dollar of the United States is required to contain 412½ grains of standard silver of which one-tenth is alloy; which is now the proportion in all coins of the United States, whether of silver or gold. The Spanish dollar of the old sort, before a new coinage took place in 1772, was of the sterling value of 4*s.* 4½*d.* Till then there were dollars of two denominations, the Mexican and the Sevillan dollar. That which is at present generally circulated as the Spanish dollar is really of the sterling value of 4*s.* 3½*d.* It passes in Spain for 20 reals vellon. The rix-dollar of the north of Europe is termed *Thaler* by the Germans; *Pezza* is the Italian and *Piastre* the Turkish dollar. See *Rix-dollar*.

Doodee and *Half Doodee*, copper pieces of 10 and 5 cash, current at Madras. They are struck in England.

Doppia, or *Pistole*, an Italian gold coin of which the value varies in different states. Kelly says, among the prices current at Genoa, July 20, 1807, the Roman doppia was at 20 lire 14 soldi; Parma, ditto, 26 lire 14 soldi; Piedmont, ditto, old, 35 lire 8 soldi; ditto, new, 34 lire 15 soldi. At Milan the value of the doppia was fixed by an imperial edict in 1786 at 25 lire 3 soldi correnti. Its English value about 15*s.* 7*d.* sterling. In the Piedmontese territory the older doppia has been long out of currency. The present is of 24 lire; the half, &c. in proportion. The old Piedmontese doppia of 1741 to 1785 was of the value of 1*l.* 3*s.* 9*d.* sterling; that after 1785, 1*l.* 2*s.* 7½*d.* The Parma doppia of 1787 was worth 17*s.* 7½*d.*; that of 1796, 16*s.* 10½*d.*

Doppietta, or gold scudo, a coin of Sardinia of 5 lire.

Doreea, a coin and money of account in Bombay; the coin is of copper with a mixture of tin or lead.

Doubla, a silver coin of Tunis, valued at 24 aspers.

Doubloon, a Spanish gold coin, the antient value of which was changed in the coinage which took place in 1772, when the former pieces were called in. The old doubloon was of the value of 3*l.* 6*s.* 5½*d.*; that of 1772, 3*l.* 5*s.* 10*d.* The double and the half of each in proportion.

Ducat, Dutch, a gold coin, of the value of 5 guilders 2 stivers. English value 8*s.* 9*d.*

Ducat, German, also a gold coin, the rate of coinage of which, although each state has its own ducats, is nearly the same all over Germany. Kelly says, according to the mint price of gold in England, as already stated, the ducat of Bavaria is worth 9*s.* 4¾*d.*; of Brunswick, 9*s.* 2*d.*; of Cologne, 9*s.* 3¾*d.*; Denmark, 9*s.* 3½*d.*; Frankfort, 9*s.* 4½*d.*; Hamburg, 9*s.* 4½*d.*; Hanover, 9*s.* 5¼*d.*; Hesse-Darmstadt, 9*s.* 5*d.*; Mannheim, 9*s.* 4½*d.*; Nürnberg, 9*s.* 3½*d.*; Prussia of 1748, 9*s.* 4¼*d.*; of 1787, 9*s.* 3¾*d.*; Treves, 9*s.* 3¾*d.*; Wirtemberg, 9*s.* 2¼*d.*; Würzburg, 9*s.* 3¾*d.*

Ducat, Russian, originally worth 2¼ rubles; the double 4½; but in 1764 their value was raised, the double ducat to 5 rubles 60 kopeks, and the single to 2 rubles 80 kopeks. Kelly rates the sterling value of the Russian ducat of 1751 at 9*s.* 1½*d.*; of 1763 at 9*s.* 3¾*d.*; and that of 1796 at 9*s.* 5*d.* This also had its double and half. According to the table of Russian moneys given in Leigh's 'Guide to Moscow,' 12mo., London, 1835, the gold ducat of Russia at present goes for 8*s.* 4*d.*

Ducat, Swedish, of gold, of the value of one rix-dollar 46 skillings, of the sterling value of 9*s.* 2¼*d.*

Ducat, the Italian, is a silver coin and money of account at Naples, Venice, and other places, value in sterling nearly 3*s.* 6*d.* The Venetian silver ducats of a former time varied both in weight and fineness. In weight from 13 dwt. 18 gr. to 14 dwt. 19 gr.

Ducatello, an Egyptian silver coin, current at Alexandria, for 10 medini.

Ducatone, or *Giustina*, a silver coin of Venice, of 11 lire, worth 4*s.* 6¼*d.*

Ducatoon, a Dutch silver coin, at 63 stivers, or a little more; English value 5*s.* 5¾*d.*

Dudu, called by the English *Dubs*, a copper coin in use in the Mysore country and at Pondicherry; in the latter place 20 of them are reckoned to a fanam.

Eagle, an American gold coin, of the value of 10 dollars, or units. Its intrinsic value in English gold was nearly 2*l.* 3*s.* 8*d.* None however have been coined at the American mint for many years. By an act of 1792 the eagle was to be of the standard weight of 270 gr., viz. 247½ gr. of fine metal and 22½ gr. alloy. By an act of 1837, when coined it is to be of 258 gr. standard weight, viz. 232¼ fine metal and 25¾ alloy. The half and quarter eagle in proportion.

Ecu, a silver coin in the old system of France, and also at Geneva and other places in Switzerland. In France it was of 6 livres; and the *Petit Ecu*, or half-crown, of 3 livres. The ecu, or patagon, of Geneva was worth 3 livres or 10½ florins. Those coined in 1796 were of the English value of 4*s.* 9*d.*

Escalin. The escalin, or shilling, was formerly a base silver coin in the Netherlands, at 6 stivers of exchange, or 7 stivers current. Of the English value of 6*d.*, and its double in proportion.

Escudo, a Spanish gold coin, of 40 reals vellon.

Fanam, a small coin in the East Indies, both of gold and silver. The gold ones are only of 7⅔ carats fine, and are alloyed chiefly with silver; 24 of these are reckoned for an old Negapatam pagoda, which went for 8*s.* The silver fanam of Bombay is worth about 4¾*d.*; that of Pondicherry 3½*d.*

Faruki, a gold coin of Mysore, struck by Tippoo Saib, of the value sterling of 7*s.* 11*d.* A variety of the pagoda.

Filippo, or *Philip*, an old silver coin of Milan, worth about 4*s.* 8¼*d.*

Florin, a money of account and silver coin in Holland, Belgium, and Germany, called also gulden and gülden, and, by corruption, gilder or guilder. The florin of Holland and Bavaria is worth about 1*s.* 8¼*d.*; the heavy (or *müns*) gulden of Austria is worth about 2*s.*

Florin is also a gold coin at Hanover and in other parts

of Germany, though chiefly current in the countries on the banks of the Rhine: passing generally for 2 rix-dollars current. Assay value about 6*s.* 11*d.*

Forli, a small copper coin of Egypt.

Fouang, a silver coin of Siam, estimated at 800 cowries.

Franc, a money of account and silver coin in the new system of France, and still more recently introduced into Belgium, with its double, quintuple, and lower proportions. Of the value of rather more than 9½*d.* It weighs 77·17 grains, and contains 69·453 grains of pure silver. The French franc and livre were formerly synonymous, but in the coinage of 1795 the franc was made too heavy, and its value was accordingly raised 1¼*d.* per cent; thus 80 francs = 81 livres.* A Swiss franc, containing 10 batzen, is equal to 1½ French franc, nearly 1*s.* 2*d.*

Francescone, a silver coin in Tuscany, of 10 paoli or 6⅔ lire; its value in sterling was 4*s.* 6*d.*

Frederick, or *Frederick d'Or*, a gold coin in Prussia, worth 16*s.* 3¾*d.* There are also double and half Fredericks.

Fyrke, a money of account and copper coin in Denmark; the half skilling.

Gall, the only coin of Cambodia, a small piece of silver, with characters on one side only; worth about 4*d.* sterling.

Ganza, a small coin in some parts of India beyond the Ganges, a mixture of copper, lead, and tin; worth usually about 1½*d.* sterling.

Genovina, a coin of Genoa, both in gold and silver. Before the year 1790 the Genovine d'oro were coined at 100 lire; halves, quarters, and eighths in proportion. The Genovine of full weight in silver were at 9 lire 10 soldi; light Genovine, weighing 32½ denari, were at 9 lire. In 1790 a new coinage took place, consisting of gold Genovine at 96 lire; halves, quarters, and eighths, at 48, 24, and 12 lire; and silver scudi or Genovine at 8 lire; halves, quarters, and eighths in proportion. Genoa being united to France in 1804, the French coins were introduced there, but the Genoese coins were still allowed to circulate, and the coinage of them to continue. The assay value of the Genovina of 100 lire was 3*l.* 9*s.* 9*d.* sterling; that of the Genovina of 1790, 3*l.* 3*s.* 4*d.*

George d'Or, of Hanover, at 4⅔ rix-dollars in cash, or 5 rix-dollars gold value. Of the value of 16*s.* 4½*d.*

Gilder, or *Guilder*, see *Florin*.

Giulio, a small coin of base silver, in Italy; half a lira.

Giustina, see *Ducatone*.

Gourde, the name given to the Spanish dollar in the islands of Martinique, St. Lucia, Guadaloupe, &c.

Grieven, or *Grievener*, a small Russian silver coin, worth about 6*d.*

Griscio, or *Albuguelp*, an Egyptian silver coin, of 30 Medini.

Groat. [COIN.]

Groschen, Good (Gut), a small coin and money of account in Prussia, Hanover, and other parts of Germany. A good groschen is 3 matthiers; a marien-groschen 2 matthiers: the former worth 1¼*d.* English, the latter 1⅛*d.*

Grossetti, coins of Ragusa, of base silver, reckoned of the same value as the paras of Constantinople.

Grote, a small coin and money of account at Bremen: 24 grotes make ⅓ of a specie rix-dollar.

Guilder, see *Florin*.

Gulden, see *Florin*.

Haser Denarie, a silver coin of Persia, of 10 mamoodis.

Imperial, a Russian gold coin, of 40 rubles; it has its half. The English mint value of the imperial coined before 1763 has been given at 2*l.* 1*s.* 6*d.*; the imperials of 1763 and 1772, at 1*l.* 12*s.* 9½*d.*; the half-imperial of 1780, at 15*s.* 4*d*; the imperial of 1801, at 1*l.* 12*s.* 2½*d.* The present value is 33*s.* 4*d.*, and of the half 16*s.* 8*d.*

Joanese, Johanes, or *Joe*, a Portuguese gold coin, of 6400 rees, of the value of 1*l.* 15*s.* 11½*d.*

Itchebo, or *Itjib*, the smallest of gold coins of Japan, valued at about 15 mas.

Kaisergroschen, a money of account and base silver coin in Bohemia and some parts of Germany. In Bohemia the kaisergroschen is sometimes called böhmen. In Bavaria it is of the value of 3 and sometimes 4 kreutzers.

Kodama, a little globular piece of silver, bearing the figure of a Japanese deity, with several letters.

Kopek, or *Copeck*, a money of account and copper coin in Russia, answering to a penny English. There are pieces of 10, 5, 2, 1, ½, and ¼ kopeks; likewise of 25, 20, 15, 10, and 5 kopeks in silver, answering to 10*d.*, 8*d.*, 6*d.*, 4*d.*, and 2*d.*

Kreutzer, Creutzer, or *Cruitzer*, a small copper coin and money of account in many parts of Germany, worth ⅓ of a penny. 60 kreutzers go to a silver florin of Holland or Bavaria.

Larin, an old coin and money of account in Persia and Arabia, of 2½ mamoodis. It consists of a silver wire, about half an inch in length, doubled up, and flattened on one side to receive the impressions of some characters.

Leopoldone, a silver coin of Tuscany, similar to the francescone; that of 1790 was of the assay value of 4*s.* 5⅔*d.*

Liard, a small French copper coin in the old system of France, of the value of 3 deniers.

Lira, a silver coin of Italy, particularly at Milan and Venice. At Milan it was to weigh 4 denari, or ⅙ of an ounce. Pieces of 1½, 1, and ½ lira were coined at Venice in 1802, consisting (in Austrian money) of 18, 12, and 6 kreutzers, which contained only ½ of fine silver. This money was called *moneta di nuovo stampo*. The lira of Milan is stated by Kelly to be of the assay value of 7½*d.*; the lira of Venice, 2½*d.* and 2¼*d.*

Lirazza, base silver pieces, current at Venice, of 30, 20, 15, 10, and 5 soldi.

Livornina, an old silver coin of Leghorn, value 4*s.* 5½*d.*

Louis, a gold coin of Malta, double, single, and half, coined by the grand-master Rohan, at 20, 10, and 5 scudi copper or current money. The value of the double louis in sterling was 1*l.* 18*s.* 1½*d.*; of the louis, 19*s.* 1½*d.*; and the half louis, 9*s.* 7¾*d.*

Louis blanc, the name for the old ecus of silver coined in France before 1726, at the rate of 9 pieces to the mark of 10 deniers 22 grains fine.

Lowen Dollar, or *Lyon Dollar*, an old Dutch silver coin at 42 stivers or a little more. It was ⅔ of the ducatoon.

Mace, a small gold coin in Sumatra, weighing 9 grains, and worth about 14*d.* sterling.

Madonnina, a silver coin of Genoa, of 20 soldi. There were formerly double and half madonnine, of 40 and 10 soldi. The double madonnina was of the value of 1*s.* 4½*d.*

Mahbub, a gold coin, the only one which is struck at Tunis, called also sultanin, valued at 4½ piastres, with half and quarter.

Mamoodi, or *Mamoudi*, a money of account and silver coin of Persia. The mamoodi of Gombroon contains ⅔ silver and ⅓ copper, and is worth nearly 3*d.* The mamoodi of Bassora is worth about 5½*d.*

Mark. [COIN.]

Mark, a silver coin in Hamburg. There is also a double mark, or 32-schillings piece. The mark is worth 1*s.* 2½*d.*

Matthier, a copper coin of Brunswick, equal to 4 pfennigs or 8 hellers.

Max d'Or, or *Maximilian*, a gold coin of Bavaria, value 13*s.* 7½*d.*

Medin, or *Medino*, a coin and money of account in Egypt. Kelly says, at Cairo 40 medini are valued at 1*s.* 7½*d.*

Mirliton, an old French gold coin.

Moco, a small silver coin in the West Indies, which consists of a round piece cut out of the centre of the Spanish dollar. It is sometimes ⅓ and sometimes ¼ of the dollar.

Mohur, a coin of gold in the East Indies. The mohur or gold rupee of the emperor Shah Allum, 1770, was of the value of 1*l.* 13*s.* 0¾*d.*; the mohur of the same, 1787, 1*l.* 13*s.* 4½*d.*; the sicca gold mohur of Bengal, of 1789, 1*l.* 13*s.* 7*d.*; the old Bombay mohur, 1*l.* 10*s.* 1*d.*; Surat mohur of the latest coinage, 1*l.* 9*s.* 2½*d.*; Tippoo's gold rupee, 1*l.* 12*s.* 1½*d.*; mohur of the Dutch East India Company, 1783, 1*l.* 12*s.* 1½*d.*; ditto, 1797, 1*l.* 10*s.* 10½*d.* Some of these had halves and quarters in proportion.

Moidore, or *Lisbonnine*, an old gold coin of Portugal, of the value of 1*l.* 6*s.* 11½*d.* sterling. It had its half, &c. in proportion.

Murajola, a small silver coin used at Bologna, double and single, of 4 and 2 soldi.

Napoleon, a gold coin in the new system of France, the successor of the louis-d'or, of the value of 20 francs. The value is 15*s.* 10*d.*; and of its double, or 40-franc. piece, 1*l.* 11*s.* 8*d.* The napoleon weighs 99·564 grains, and contains 89·61 grains of pure gold.

Noble. [COIN.]

Noir, see *Dog*.

Oban, the largest gold coin of Japan, three times the value of the copang.

Onza, a Sicilian coin of the value of 30 tari, each taro being subdivided into 20 grani. Its value is about 10*s.* 3½*d.*

Ore, a money of account and copper coin in Sweden.

Osella, a silver medal rather than a coin of Venice, formerly distributed by the government. Kelly says however they have been circulated at 3 lire 18 soldi. He gives the value in sterling at 1*s*. 7¾*d*.

Pagoda, a gold coin on the Coromandel coast, in the East Indies. Kelly enumerates several kinds, with the assay value of each annexed, viz. the star pagoda of the value of 7*s*. 5½*d*.; old Arcot pagoda, 7*s*. 2*d*.; new Arcot pagoda, 5*s*. 8¾*d*.; Onore pagoda, 7*s*. 10*d*.; Mangalore pagoda, 7*s*. 10¾*d*.; pagoda with a crescent and one figure, 7*s*. 6*d*.; pagoda of Pondicherry, 6*s*. 5*d*.; Hyderee hoon, or pagoda, 7*s*. 8*d*.; Sultannee hoon, or pagoda, 8*s*. 5*d*.; Tippoo's farufei, 7*s*. 11½*d*.

Paolo, a small silver coin at Florence, Rome, and other places in Italy, with its double, half, and quarter. The value of the paolo is 5¼*d*.

Papetta, a small silver coin of Rome, value 10½*d*.

Para, a small Turkish coin, of the value of three aspers. 40 paras = 1 piastre.

Pardo, or *Pardao*, a silver coin and money of account at Goa; as a coin it is worth four good tangas, equal to 2*s*. 6*d*. sterling. There are pardo-xeraphins of five good tangas: a xeraphin is worth 3*s*. 1½*d*.

Pataca, a silver coin of Brazil, of 600 and 640 rees, current only in that country. Kelly gives the sterling value of two or three sorts: the old pataca of Brazil of 640 rees, 3*s*. 1½*d*.; pataca of 600 rees, 1755, 2*s*. 10½*d*.; ditto of 640 rees, 1768, 2*s*. 10¾*d*.; ditto of 640 rees, 1801 (half, quarter, &c., in proportion), 3*s*. 0½*d*.

Patagon, or *Patacon*, called also *Ecu*, a silver coin in Switzerland, and also at Liège. In Switzerland its value is 3 livres 6 sous, or 33 batzen. At Liège it is worth 4*s*. 4*d*.; at Berne, 4*s*. 9½*d*.

Peceta, a Spanish silver coin: the old Mexican peceta of two Mexican reals, 1736, was of the value in sterling of 1*s*. 1*d*.; the peceta of two reals of plate, 1721, and the peceta of two reals of new plate, 1775, 10*d*.; Mexican peceta, 1774, 1*s*. 0¾*d*.

Penny, English. [Coin.]

Perpero, a silver coin of Ragusa, of 12 grossetti.

Pfennig, a Prussian coin, worth one-tenth of an English penny.

Piastre, a money of account and a silver coin in Turkey and the Levant; it is in fact the Turkish dollar. The piastre of Mustapha III., 1757, was of the sterling value of 1*s*. 10½*d*.; the piastre of Abdul-Hamed, 1773, 1*s*. 8½*d*.; another of the same period, 1*s*. 10½*d*.; the piastre of Selim, 1801, 1*s*. 1½*d*.; the piastre of Crim Tartary, 1778, 1*s*. 0¾*d*.; piastre of Tunis, 1787, 1*s*. 1½*d*.; the piastre of Smyrna, of 1808, 12½*d*.

Pice, a money of account and a copper coin in the East Indies, the latter a mixture of tin and lead, current at Bombay.

Piece of Eight, the Spanish dollar; also a money of account in what used to be the Danish West India Islands.

Pistereen, or *Piastrine*, the name given in the West Indies to the Spanish pecetas. Kelly says pistereens, or two-bit-pieces, which are Spanish pecetas, pass for 1*s*. 3*d*. currency, and are worth 10½*d*. sterling. He adds, English shillings and sixpences occasionally pass here for pistereens and bits.

Pistole, German. Under this name are included the old Saxon August d'Or, Prussian Frederick d'Or, Brunswick Carl d'Or, Hanoverian George d'Or, Danish Holstein Christian d'Or, and the pistoles of Hesse, the palatinate, Hildesheim, and Mecklenburg, all reckoned at 5 rix-dollars current. Kelly says 35 pieces of each of these sorts of money are to weigh a Cologne mark of fine silver. An allowance is however generally made for deficiency in weight and fineness, and they are current in most places as long as 35¾ pieces weigh a Cologne mark of gold, 21¾ carats fine; they are then called passier pistoles.

Pistole, Italian, see *Doppia*.

Pistole, Spanish, see *Doubloon*.

Pistole, Swiss. The old pistole of Geneva was of 11 livres 10 sols; the later pistole, coined after 1752, 10 livres current or 35 florins, with double and triple pistoles in proportion. By a law of the diet of the Helvetic Confederacy of 1804, such of the cantons as wished to have them were to regulate the coinage in such a manner that the franc might contain 8½ Swiss grains of fine gold. The sterling value of the old pistole of Geneva, according to Kelly, was 16*s*. 4½*d*.; of the new or later pistole, 14*s* 2*d*. The pistole of Lucerne, as well as that of the Helvetic Republic of 1800, was worth 18*s*. 9*d*.; that of Soleure, 18*s*. 10¾*d*.

Pities, small coins in the Isle of Java, the only money of the natives, containing four parts of lead and one of tin: 25 of these pass for two doits, or duyts.

Placket, or *Plaquette*, a silver coin in the Netherlands, of 3½ stivers current. Old pieces of this denomination pass for 2½ stivers. Value in sterling 2¾*d*.

Plates, the denomination given to certain large copper coins, formerly used in Sweden. Kelly says, 'The large copper pieces of the value of 4, 3, 2, 1, ½, and ¼ silver dahler, or 12, 9, 6, 3, 2¼, and 1½ koppar dahler, weighing 7¼, 5¼, 3¾, 2¾, 1⅞, 1¼, and ⅝ lb. of the victualie or common weight, are no longer considered as a legal coin, but as a sort of merchandise, which every one is at liberty to sell or export after paying the duty on exportation. These in general, but more particularly the 2-dahler pieces, are called plates.'

Plott, a silver coin formerly used in Sweden, ⅓ of the rix-dollar, of the value of 1*s*. 6*d*. sterling.

Poltin, Poltina, Popoltin, Russian silver coins, of 50 and 25 kopeks, the half and quarter ruble. The poltin of the empress Anne was of the value of 1*s*. 9*d*.; that of Elizabeth, 1*s*. 10*d*.; of Catharine II., 1*s*. 7½*d*.; of Paul, 1*s*. 7½*d*.; of Alexander, 1*s*. 7*d*. The halves in proportion.

Polturat, a coin of Hungary, which, with the groschels and pfennigs, sometimes contains a little silver, and sometimes consists entirely of copper.

Polushka, a copper coin of Russia, a quarter kopek.

Quadruple, the doubloon of 8 escudos, or quadruple pistole of Spain. Its value in English gold coin has been stated to be 3*l*. 4*s*. 0½*d*.

Quattrino, a copper coin in Italy, of 4 denari di lira. At Rome 5 quattrini make 1 paolo.

Ragusina, see *Talaro*.

Rathspræsentger, a silver coin of Aix-la-Chapelle, double, single, and half, of 32, 16, and 8 marks, value 1*s*. 4½*d*., 8*d*., and 4*d*.

Ree, a Portuguese money of account. The gold milree (or piece of 1000 rees) which was coined for the African colonies in 1755 was of the value of 3*s*. 2½*d*.; but the milree is generally valued at about 5*s*.

Real. There are three small Spanish silver coins called reals, namely, the real of Mexican plate, the real of provincial plate, and the real vellon; the two former are worth about 5*d*., the real vellon 2¾*d*. sterling.

Rix-dollar (a corruption of the German *Reichsthaler*), a money of account and silver coin in Holland, Germany, Denmark, and Sweden. At Amsterdam a rix-dollar is worth 2½ gilders, 50 stivers, or 800 pfennings, equal to 8*s*. 4*d*. Flemish. In Germany the rix-dollar is worth 2 florins. The assay varies, but the general value, English, is 4*s*. 2*d*. In 1813 a new monetary system was introduced into Denmark. Two of the new rigsbank dollars equal one of the old specie dollars; and the new dollar is divided into 6 marks of 16 skillings each; its value is about 2*s*. 3½*d*.

Roubbie, a Turkish gold coin, the third of the sequin, which is called mahbub.

Roup, a Turkish silver coin of 10 paras.

Ruble, or *Rouble*, a money of account, and a platinum and silver coin in Russia. The platinum coins are a six-rouble piece, value 18*s*. 6*d*., and a three-rouble piece, of 9*s*. 3*d*. Of the silver roubles, there is the old rouble, before 1763, worth 3*s*. 6*d*.; the new rouble, since 1763, worth 3*s*. 1*d*.; with the halves of each in the same proportions.

Rundstyck, a Swedish money of account and copper coin, of 1 ore koppar; there are also half-rundstycken.

Rupee, a money of account and silver coin in the East Indies. The coins, which were formerly struck at the Calcutta mint, were sicca rupees, also called silver rupees, and gold mohurs, sometimes called gold rupees; 16 of the former, by regulation, were to pass for one of the latter. The silver rupee had its half. Kelly says, 'The old Bombay rupee was the same as that formerly coined at Surat under the Mogul: it weighed 178·314 English grains, and contained 1·24 per cent of alloy. By an agreement of the English government with the nabob of Surat, the rupees coined by both were to circulate at an equal value; and they mutually pledged themselves to keep up the coin to its exact standard of weight and fineness. The nabob's rupees however were soon after found to contain 10, 12, and even 15 per cent of alloy, in consequence of which, most of the Bombay rupees were melted down and re-coined

at Surat: the coinage of silver in the Bombay mint was suspended for twenty years, and the Surat rupees were the only ones seen in circulation. At length, in 1800, the Company ordered the Surat rupee to be struck at Bombay, and since that period the rupees of both places have been kept at an equal value, weighing 179 English grains, and valued at 2s. 3d. In the Company's financial accounts submitted to parliament, the Bombay rupee is reckoned at this value, and there it bears a batta of 16 per cent. against current rupees.' Kelly, 'Universal Cambist,' 2nd edit., 4to. 1821, vol. i., p. 170, gives a large list of rupees, with their assay and value in sterling, varying from 1s. 10d. to 2s. 0¾d. The rupee of Persia is a piece of 10 mamoodies.

Ruspono, a gold coin of Tuscany, a piece of 3 sequins, weighing 8 denari 21 grani, Florence weight, and passing for 40 lire or 60 paoli. Value in sterling, 1*l.* 8*s.* 5¼*d.*

Ryder, or *Ruyder*, called also *Standpenning*, a gold coin of Holland. By a regulation of 1749, its value was fixed at 14 florins. Value, 1*l.* 4*s.* 10*d.*

Ryksort, a Danish silver coin at 24 skillings.

Schilling, or *Skilling*, also called *shilling* and *escalin*, a money of account and copper or base silver coin in several parts of Germany, at 12 pfennigs.

Schuit, a silver ingot used as money in Japan. It is of the value of 1*l.* 5*s.* 3*d.*

Scudino, a gold coin of Modena, of 9 lire.

Scudo, a money of account and a silver coin in many parts of Italy, at Sicily, and Malta. The scudo of Rome is worth 4*s.* 4*d.*

Sechsling, a copper coin of Hamburg, of 6 pfennigs.

Sennis, or *Cashes*, are small pieces of iron, copper, or brass, having a square hole in the middle, through which, as in China, they are strung on a wire or thread in various numbers, 600 of the smallest being reckoned for a tale.

Sequin, or *Zecchin, Italian*, called also *Gigliato*, a gold coin of Venice, Genoa, Rome, Milan, Piedmont, and Tuscany, of the average value of 9*s.* 5*d.*

Sequin, or *Checqueen, Turkish*; the gold coins of Turkey are the sequin funducli, with halves and quarters; the double sequin, or yermeebeeshlik, the misseir, and the rubich. There are other sequins beside the above, which bear different names, and their values also vary according to the periods of their coinage.

Sesthalf, or 5½-stiver piece, a base silver coin in Holland, or base shilling; value 5½*d.*

Shahee, or *Shatree*, a Persian silver coin, the half of the mamoodi.

Shilling, English silver coin, weighs 87·27 grains, and contains 80·727 grains of pure silver.

Shoe of gold, an ingot used as money in China. The name is English. Kelly, speaking of China (vol. i., p. 67), says, 'Gold is not considered as money, but as merchandise; it is sold in regular ingots of a determined weight, which the English call *shoes* of gold; the largest of these weigh 10 tales each, and the gold is reckoned 94 touch, though it may be only 92 or 93.'

Sixpence, English silver coin, half a shilling.

Skilling, see *Schilling*.

Slant, a copper coin of Sweden, single and double, of 1 and 2 ore silver, or 3 and 6 ore koppar.

Soldo, a small copper coin of Italy. There are half soldi, and quattrini, the fifth part of a soldo.

Sou, or *Sol*, a money of account and copper coin in France and Switzerland. Everywhere of 12 deniers.

Souverain or *Severin*, a gold coin, chiefly coined in the Netherlands when subject to Austria. Its value was 13*s.* 10*d.*

Sovereign, English gold coin, weighs 123·274 grains, and contains 113·001 grains of pure gold.

Stambouly, a Constantinopolitan coin, current at Bassora for 20½ mamoodies.

Stiver, a money of account and copper coin in Holland and the Netherlands, containing 2 groots Flemish, or 8 duyts, or doits.

Stooter, a small Dutch silver coin, at 2½ stivers.

Sware, or *Schware*, a money of account and copper coin of Bremen. The smallest piece there current.

Syfert, a copper coin of Embden, at 5 wittens; 108 go to the rix-dollar.

Talaro, a silver coin of Tuscany, Ragusa, and Venice; at Ragusa it is or was the highest silver coin, worth 3*s.* 1½*d.* sterling; it had also the names of vislino and Ragusina.

Tale, see *Cash*.

Taro, a money of account and copper coin of Naples, Sicily, and Malta, of the value of 4*d.*; 12 go to the scudo, or Sicilian dollar. There are pieces of 4 and 2 tari.

Testone or *Testoon*, a silver coin in Italy, and also in Portugal. In Italy the testone of Bologna is rated at 30 soldi; at Parma the testone is of 6 lire 6 soldi; at Rome of 6 paoli. Kelly gives the sterling value at a little more than 1*s.* 3*d.* The assay value of the Portugal testoon he gives at something more than 6*d.* See *Vintem*.

Thaler, the ordinary name in Germany for the rix-dollar.

Veinten de Oro, see *Coronilla*.

Vintem. At Lisbon there are silver Portuguese coins current of 6 vintems, or 120 rees. At Rio de Janeiro in Brazil there are vintems of copper also current for 20 rees; with half and quarter vintems, and two-vintem pieces.

Xeraphin, see *Pardo*.

Zlot, a Polish coin, worth nominally 15 kopeks, but passing current for 60 kopeks. It is worth 9*d.* English.

Zolotta, or *Izelotta*, a Turkish silver coin, of 30 paras.

In the above enumeration moneys of account have been only noticed where they were represented by real coin. There are numerous others which are not so represented. For these our space will only allow us to refer to the general index and Commercial Dictionary appended to Kelly's 'Universal Cambist,' a work to which the present article is greatly indebted.

It is worthy of observation, says Kelly, that the progress of metals as representatives of property seems to have kept pace with the increase of wealth and commerce. Thus iron, brass, and copper first answered the purposes of money. Silver next succeeded; after which gold was adopted; but the great increase of business in modern times has rendered even the precious metals insufficient as a circulating medium. Paper therefore has been substituted in various ways; and it is generally found more convenient and manageable than specie. Where credit cannot be given, the precious metals are necessary; but where well founded credit exists paper is greatly preferable; it is exempt from most of the imperfections and disorders of coins, and in many other respects it greatly facilitates the operations of trade and commerce.

Moneys of account may be considered with respect to coins as weights and measures with respect to goods, or as a mathematical scale with respect to maps, lines, or other geometrical figures. Thus they serve as standards of the value both of merchandise and of the precious metals themselves. It should however be remarked that moneys of account, though they are uniform as a scale of divisions and proportions, yet they fluctuate in their intrinsic value with the fluctuation of the coins which they measure or represent.

There is great inconvenience in the present system of money reckoning and the coins of most people, and particularly when we have to change money of one nation into its equivalent in the money of another nation. It is also very inconvenient and tedious to add large sums, such as pounds, shillings, and pence, in the money of our own country. In the United States of North America, the advantages arising from the dollar being the money of account, and being divided into 100 equal parts or cents, are very obvious. A slight inspection of such questions as occur in the common arithmetic books of that country will show the great facilities which this monetary system offers for all mercantile transactions. An ingenious correspondent has observed that it would be easy to bring our own system of coins to a decimal standard. We should only require a double shilling to be coined, and then we might say ten shillings make one pound. If a double penny of silver were coined, of the value of one-tenth of this double shilling, we might then say ten pennies make one shilling. With a small alteration of the copper farthing, we might say ten farthings, or ten dimes (tenths), make one penny. There would thus be no number of a denomination less than a pound that would exceed *nine*. The table of English money would then run thus:—

		Old money.
10 dimes make	1 penny . .	2½*d.* nearly
10 pennies „	1 shilling .	2*s.*
10 shillings „	1 pound . .	20*s.*

(Snelling's *View of Coins at this time current through Europe*, 8vo., Lond., 1766; Marsden's *Numismata Orientalia Illustrata*, 4to., Lond., 1823-5; Kelly's *Universal*

Cambist, 2 vols. 4to., Lond., 1831; *Münz-Cabinet; Le Cabinet de Monnaies du Voyageur et du Negotiant*, publié par Engelmann père et fils, à Mulhouse, 8vo., 1835; Tucker's *Theory of Money and Banks investigated*, 8vo., Boston, 1839; *Guides* and *Handbooks* of the different countries of Europe, &c.)

MONFERRATO is the old name of a large district of northern Italy, which extends from the southern bank of the Po to the Ligurian Apennines. During the middle ages it was a distinct principality, with the title of Marquisate, but is now merged in the territories of the Sardinian monarchy. Many parallel offsets branch off in a northern direction, from the Ligurian Apennines to the southern bank of the Tanaro, and the intervening valleys are watered by numerous streams, the Stura, the Gesso, the Borbio, the Pesio, the Ellero, the Tanaro, the Belbo, the two Bormide, the Erro, and the Orba, all of which join the Tanaro above Alessandria, below which town the Tanaro enters the Po. North of the Tanaro another range of hills, parallel with the course of the Po, runs from the mount of Superga, opposite to Turin, to the town of Casale, and divides the valley of the Upper Po from that of the Tanaro. The greater part of this hilly region, on both sides of the Tanaro, went by the name of Monferrato, and was divided into High Monferrato, south of the Tanaro, towards the Ligurian Apennines, and Lower Monferrato, extending from the Tanaro to the banks of the Po. The principal towns of Lower Monferrato were Alessandria, Asti, Casale, and Valenza; those of Upper Monferrato were Mondovi, Acqui, and Alba. It is altogether a favoured region, rich in corn, wine, fruit, silk, and cattle. The wines of Monferrato are the best in northern Italy; the muscat of Asti is particularly esteemed. The peasantry of this district have the character of being high-spirited, lively, and industrious; their national dance, which is called Monferratina, and by corruption Monfredina, is well known all over Italy, and is a favourite in large and especially rural dancing parties.

Some pretend that the name of Monferrato is a corruption of 'Mons ferax,' a fertile mountain or range of hills. (Alberti, *Descrizione di tutta Italia*.) The house of Monferrato is said to have descended from the imperial family of Saxony in the tenth or eleventh century, when they obtained this marquisate as a fief of the empire. Several marquises of this dynasty distinguished themselves in the wars of the crusades, and they intermarried with the Baldwins and the Lusignani, kings of Jerusalem, and also with the Palæologi, emperors of Constantinople, a branch of which last family inherited the marquisate of Monferrato and governed it till the time of Charles V., when, their male line becoming extinct, it was succeeded by the Gonzaga of Mantua, who were the next heirs in the female line. At the death of Francesco Gonzaga, in 1612, who left no male issue, the duke of Savoy advanced a claim to the inheritance of Monferrato, on the plea of former intermarriages between his ancestors and the former Palæologi dynasty of Monferrato. This was the cause of long and tedious war between the brother of the late duke of Mantua and the duke of Savoy, in which quarrel Spain and France interfered, and afterwards became principals. At last, by the peace of Cherasco, in 1630, part of Monferrato was given to the duke of Savoy, and the rest remained with the duke of Mantua. During the war of the Spanish succession, when the last duke Gonzaga was deprived of Mantua, the whole of Monferrato was given to the duke of Savoy. [GONZAGA.] It is now divided into the administrative provinces of Acqui, Alba, Alessandria, Asti, Casale, and Mondovi. The name of Monferrato is still used however in Piedmont to designate the whole tract of country.

MONGAULT, NICOLAS HUBERT DE, born at Paris in 1674, studied under the fathers of the congregation of the Oratory, and afterwards became preceptor to the duke of Chartres, son of the duke of Orleans the regent, by whose interest he obtained several offices under government. He became a member of the French Academy in 1718. Mongault died at Paris in 1746. He made a French translation of Herodian (Paris, 1745), and also a very good translation of Cicero's letters to Atticus (Paris, 1738), with numerous and useful notes. Both these works, and the last especially, are among the best translations from the classics which the French language possesses.

MONGE, GASPARD, born at Beaune, in 1746, died at Paris, July 28, 1818. Being one of the members expelled from the Institute at the Restoration, no *éloge* of him appears in the memoirs* of that body. Immediately however after his death, two accounts, if not more, were published, one by M. Brisson, 'Notice Historique sur Gaspard Monge,' Paris, 1818; the other by M. Charles Dupin, 'Essai Historique sur les services, &c. de Gaspard Monge,' Paris, 1819. We have drawn the materials of the following account from the latter.

The father of Monge was, we suppose, a thriving inn or hotel keeper, 'possesseur d'une opulente hôtellerie,' and Madame Roland styles him 'maçon parvenu.' Of his education little is said, nor is much to be expected, when we find him 'employed at the age of sixteen, in the college of Lyon, to teach the natural philosophy which he had come there to learn the year before.' The clergy who superintended the establishment used all means of persuasion to induce their young pupil to enter the church, but the construction of a plan of his native town brought him at this time under the notice of a colonel of engineers, who procured for him and persuaded him to accept an appointment in the college of engineers at Mezières, where he remained till 1780, when he was appointed professor-adjoint with Bossut, in teaching hydrodynamics at the Louvre. During his stay at Mezières, observing that all the operations connected with the construction of plans of fortification (such as the French call *défilemens*) were conducted by long arithmetical processes, he substituted a geometrical method, which the commandant at first refused even to look at, so short was the time in which it could be practised: it was however received with avidity when further inspected, and Monge, continuing his investigations, soon generalised the methods employed into that great alphabet of the application of geometry to the arts which is now called descriptive geometry. Such however was the system of the French schools before the Revolution, that the officers who had been trained in this application were strictly forbidden to communicate its methods even to those who were engaged in other branches of the public service. Monge himself, in 1780, conversing with his pupils Lacroix and Gayvernon, was obliged to say, 'All that I have here done by calculation, I could have done with the ruler and compass, but I am not allowed to reveal these secrets to you.' But M. Lacroix, whose name is now too well known to require further mention, set himself to examine how this could be, detected the processes employed, and published them in 1795, under the title of 'Complémens de Géométrie.' The method was published by Monge himself, first in the form in which the shorthand writers took them down from the instructions given at the Normal school (an III., or 1794-95), and again (an VII., 1798-99) also in the collected edition of the 'Leçons de l'Ecole Normale,' 1800; and finally in the well known work 'Géométrie Descriptive' (fourth edition, 1820), which, in simplicity, style, and choice of details in a subject which might easily have been overloaded with them, stands second to no elementary work whatever. Monge was unrivalled in the communication of instruction, and in the interest which he could excite in the minds of his pupils: M. Dupin relates, that in his walks with them in the neighbourhood of Mezières, both professor and pupils would walk through the brooks without the least attention to where they were going, all intent on the subject upon which he was conversing.

In 1780 he was elected of the Academy of Sciences, and in 1783 he succeeded Bezout as examiner of the naval aspirants: he then quitted Mezières entirely, at which place, since his partial removal to Paris, he had hitherto been occupied during half of the year. For his new pupils he wrote his treatise on Statics ('Traité élémentaire de Statique,' first edition, 1786; fifth edition, 1810); a short and purely synthetical treatise, which is even yet, we think, the best introduction from geometry to that subject. He was forbidden (in instructions from Borda) to employ any other method: and though Dupin cites this in excuse, we must take the liberty of thinking that the mathematical taste for which Monge was so conspicuous would secure his ready acquiescence in the restriction, considering the class of pupils for whom he was to write; if indeed, which is very likely, it was not suggested by himself.

When the wars occasioned by the Revolution were on the point of breaking out, Monge was appointed minister of marine. If we were writing his political life, we should have to look for information elsewhere than from M. Dupin, who

* Since the article CARNOT was written, his éloge has, we believe, been read, though it is not yet printed. Doubtless that of Monge will follow in time.

simply states the appointment, touches on the misfortunes which happened at sea during his administration, commencing the whole with an indignant denial of Monge having been concerned in any of the cruelties of the period. From this we are to suppose that he has been charged with some participation in them, which, though unlikely from his general character, should be matter of special examination to those of his own country who may hereafter write his life. He quitted this post without remaining long in it, and became busily engaged in the operations for the equipment of the army. The enormous exertions which were made and the singularity of the crisis are well known: war had been declared, twelve hundred thousand soldiers were to be called into the field, and the steel which was to form their bayonets had not yet left the ore, nor was the saltpetre which was to give them powder manufactured. Many articles for which France had hitherto depended on foreign countries were unattainable, and the raw material was to be procured, the methods of working it in some cases even invented, in all to be described and taught; while the enemy was almost upon the frontiers. M. Biot, in his 'Essai sur l'Histoire general des Sciences pendant la Révolution Française,' Paris, 1803, has given a summary of what was done: he does not appear to go too far in saying that the means of procuring iron, steel, saltpetre, gunpowder, and weapons, were *created* during the reign of terror. And while the ordinary manufactures were deprived of their materials and of their workmen, all the branches of engineering were also at a stand, from those who could by any process be converted into military men being required for the army. The schools of instruction in these branches had been shut up; and in such a state was the hope of future public officers when, in great part by the exertions of Monge, the Normal and Polytechnic schools were established: the first for the exigencies of the moment, to accelerate the formation of a supply of good teachers; the second for the permanent means of formation of every department of engineers. Monge himself taught in both. Considering the present state of theoretical instruction in France, we may form an idea of the improvement which has taken place from the computation of Vauban, who estimated that one-sixth of the expense of fortified places in that country was incurred in providing and instructing proper persons to superintend the constructions.

Monge accompanied the army in the invasion of Italy, and was largely concerned in those wholesale robberies for which restitution was made in 1815. These however must be charged on the general: while to the commission, of which Monge was one, must be allotted the merit not only of having safely conveyed enormous pictures and statues to Paris, but of having repaired the ravage of time and carelessness. In some instances pictures painted on wood were planed at the back until the design was shown, and the remainder was then fixed upon another tablet. Monge also accompanied the expedition to Egypt, and to him, with Berthollet and Fourier, all the scientific fruit of that undertaking are due, not only as the collectors, but even as the manual defenders of what they had gained. On the occasion of a revolt at Cairo, in which the communication was cut off between the house of the Egyptian Institute and the military power, the savans, headed by Monge and Berthollet, defended their premises until assistance arrived. During this expedition a strong friendship grew up between Monge and the future emperor, which made the former a zealous partisan of the latter to the end of his career. The consequence of this attachment was, that Monge was among those who were expelled from the Institute at the final restoration of Louis XVIII. This, and the destruction of the Ecole Polytechnique (since revived), are placed by Dupin among the causes of his death, which took place, as before stated, July 28, 1818.

Besides the works already mentioned, we have the 'Description de l'art de fabriquer les Canons,' Paris, an II., and 'Feuilles d'Analyse appliquée à la Géométrie,' an III. The latter work in the subsequent editions was called 'Application d'Analyse à la Géométrie' (fourth edition, 1809).

There is also a large number of memoirs in the 'Mémoires de Turin,' 'Mémoires des Savans Etrangers,' 'Mémoires de l'Académie des Sciences,' 'Journal de l'Ecole Polytechnique,' 'Correspondance Polytechnique,' 'Annales de Chimie,' and 'Description de l'Egypte.'

The science of descriptive geometry, with its numerous applications to the description of machines, to perspective, architecture, fortification, &c. &c., might be explained at length, but not with much profit to the general reader. [GEOMETRY, vol. xi., p. 156.] Of its remarkable results on pure mathematics we have spoken in the place just cited. The analytical discoveries of Monge are hardly less remarkable. He first applied the differential calculus to the general theory of surfaces, in doing which he enlarged the bounds of that science materially, and added many useful theorems, giving to the consideration of the calculus of three variables all that illustration and clearness which his predecessors had, by means of plane geometry, imparted to the less difficult case of two variables. In this field however he had predecessors and rivals; in that of geometry, such as he made it, he had neither the one nor the other. Since the time of Euclid and Archimedes, that science had received no such accession as he furnished; and the epoch, which will be known by the name of Monge, will divide its history.

MONGHIR. [HINDUSTAN, p. 218.]

MONGO'LIA (the Country of the Mongols) comprehends a vast extent of country in the interior of Asia, between 38° and 53° N. lat. and 84° and 124° E. long. Its length from east to west exceeds 1700 miles, and its width, from north to south, between 100° and 110° E. long., 1000 miles; but towards both extremities of its length it narrows to 600 miles. Its area may amount to between 1,200,000 and 1,300,000 square miles. On the north it borders on Siberia, on the east on Mandshooria, on the south on Proper China, and on the west on the Chinese province of Kan-su (which once formed a part of Mongolia, and has only been dismembered from it in modern times), and on Songaria, or the Chinese government of Thianshan Pelu.

This country is often called Tartary even by modern writers, and not without some degree of propriety, as the Tata or Tatar properly constituted, at the time of Gengis Khan, a very powerful tribe of the Mongols, distinguished by their valour and military achievements. But the European writers of the middle ages applied that term to some of the tribes of the Turkis, which belong to the Caucasian race, and this use has become common. [MONGOLS.]

The middle portion of Mongolia is occupied by the Great Gobi (Ta-Gobi), which stretches across the country south-west and north-east from the boundary-line of the province of Kansu to the Dalai Nor, near the boundary of Da-uria, with an average width of about 200 miles. The Gobi is the worst part of the country, the surface being covered with sand or small stones, and the vegetation being very scanty and occurring only in single spots. [GOBI.] Vast tracts of it are level, but, at great distances from one another, there are hills of moderate elevation. The whole region is destitute of trees, and the water, which is only found at some distance below the surface, is brackish. South-east of the Gobi extends a more elevated and uneven country, which terminates in a mountain-range of considerable elevation.

This range begins on the south, near the most southern point of Mongolia, not far from the banks of the river Hoang-ho, about 38° N. lat., and extends northward along that river for nearly 400 miles. It is covered with wood, and called Alashan, or Ho-lang Shan. Near 42° N. lat. it turns abruptly to the east, forming nearly a right angle, and it is then called Inshan by the Chinese, and Onghiun Oöla by the Mongols. In this direction the chain continues, between 41° and 42° N. lat., about 600 miles, when it again turns north, though less abruptly, and proceeds in a north by east direction from 42° to 55° N. lat. under the name of Khing-khan Oöla. Little is known respecting the width and elevation of this extensive range. The highest portion seems to be at the point where it turns northward, and where a peak, called Petsha, rises far above the snow-line, and is supposed to attain a height of more than 15,000 feet above the sea. The country which skirts this range along its western and northern base, and extends from it to a distance of between 50 and 100 miles, has a broken surface, the hills rising to some height above the valleys and small plains. It is not deficient in water; but trees occur only in isolated tracts. As its elevation above the Gobi is considerable, and probably not less than 5000 feet above the sea-level, and as it is also much exposed to the cold winds which blow with great force over the desert, it is nearly unfit for agriculture, and only used as pasture-ground for horses, cattle, and sheep.

South of the Inshan Mountains the country exhibits fer-

tile valleys and mountains, partly wooded, as far west as the place where the Hoang-ho river turns southward: this fertile tract is included in the Chinese provinces of Pe-tche-li and Shan-si. But the tract farther west, which is surrounded by the great northern bend of the Hoang-ho, partakes strongly of the features of the Gobi, and forms part of Mongolia: it is called the country of the Ordes, taking its name from a Mongolian tribe which belongs to the great division of the Tshakhar Mongols. This whole tract is covered with hills composed of loose sand, mostly without water, and entirely destitute of trees. But the numerous depressions contain extensive meadows, with rich grass and bushes. The attempts to cultivate some parts of it have not proved successful, and accordingly it is abandoned to the Mongols and their herds; but in order to prevent them from plundering the adjacent agricultural districts of the neighbouring provinces of Shen-si and Kan-si, the great Chinese wall was built across the peninsula from east to west from Pao-tsheou to Nin-ghia.

That part of Mongolia which is to the east of the Khing-khan Oöla, and extends nearly to the shores of Hoang-Hai, or the Yellow Sea, from which it is only divided by a narrow fertile tract belonging to the province of Leao-tong, is called Kortshin. This name is properly only applied to the tract north of the river Sira Muren, or Leao-ho, which resembles the country of the Ordes, except that it is less intersected by sand-hills. A great portion of it seems to be of inferior fertility; but south of the river Sira Muren the country contains numerous meadows clothed with rich grass, and agriculture has been introduced here by the Chinese, who send to this country their criminals who are condemned to transportation. The greater part of it however serves only as pasture-ground. This was the condition of the country above a hundred years ago, when it was visited by Europeans. It would seem however that agriculture must have greatly extended since that time, as it is a known fact that great quantities of grain, especially wheat, are exported from the province of Leao-tong to Peking and Shanghae. The most southern district of this country is traversed by an offset of the Khing-khan Mountains, which offset branches off from the principal range near the peak of Petsha, and extends in a south-eastern direction to the Hoang-hai, where it forms the high, rocky, and mountainous shores along the western side of the gulf of Leao-tong north of the mouth of the river Lan-ho. The declivities of this range are abundantly watered, but the northern side is bare and destitute of wood; whilst the southern is overgrown with pine, fir, oak, lime, walnut, and other trees, and is the haunt of numerous wild animals, among which are tigers and leopards. It constitutes the most extensive hunting-ground of the Chinese emperor, and contains the royal palace of Ichol, which was visited by Lord Macartney and described by Sir George Staunton. The tract on both sides of the Lan-ho is an agricultural country of great fertility and well cultivated. Though included within the boundary of Mongolia, it is inhabited by Chinese, and is very populous. Besides several small towns, it contains the large town of Quan-tshing.

The country which extends along the north-western side of the Ta-Gobi is nearly unknown, with the exception of the eastern part, which is traversed by the caravan road from Kiachta in Siberia to Khalgan in China. Here too the surface of the country is frequently broken by hills and isolated ridges; but the intervening level tracts contain rich pasture-ground. It is mostly well watered, but wood is scarce. In advancing northward the hills grow higher, and the valleys or intervening level tracts become narrower, till near the boundary-line between Mongolia and Siberia the country rises into mountains, which run in a continuous chain, and are that portion of the Altai Mountains which is known under the name of Khing-khan Oöla. [ALTAI MOUNTAINS.] The width of this mountainous and uneven country, which lies between Siberia and the Ta-Gobi, seems on an average to be about 150 miles. In it originate the river Selenga and its numerous upper branches, of which a short account is given in ALTAI MOUNTAINS, vol. i., p. 399. Here also rise the Kerlon and the Onon, two large rivers, which by their union form the Amur. [AMUR, vol. i., p. 477.] This country, which is rich, when compared with other portions of Mongolia, belongs to the high-priest of the Buddhists, who resides in the neighbourhood of the town of Urga, and is called Kootookhtu. It forms a separate government of the Chinese empire, and its general governor, called *vang*, or *kiun-vang*, as well as the lieutenant, called *amban*, reside in the town of Urga, or Oergo. This town is built in a small plain; but though sheltered by mountains against the northern winds, the climate is too cold to permit the most common vegetables to be raised, which are accordingly brought to it from Mai-mat-shin, a place two degrees farther north. Its population does not exceed 7000, of which 5000 are said to be lamas, or persons belonging to the ecclesiastical establishment of the Kootookhtu; but it is a place of considerable traffic, being a depôt for the goods intended for the trade with Siberia, and also for those Chinese productions and manufactures which are consumed in the parts of Mongolia farther to the west. Many of the Mongolian princes, whose tribes wander about in the Ta-Gobi and the adjacent countries, are obliged to reside in this town, in order that their views may be known to the Chinese governor, who is a Mandshoo, and commonly a relation of the emperor. Here also is the supreme court, called Yamoun, for the administration of justice in that part of Mongolia which is inhabited by the Khalkas. This place may in fact be called the capital of Eastern Mongolia. The small town of Mai-mat-shin is on the very boundary-line of Siberia, and less than a mile from Kiachta. [KIACHTA, vol. xiii., p. 209.]

The western portion of Mongolia, extending from 84° to 96° E. long., between Siberia and the most western extremity of the province of Kan-su, has never been visited by Europeans; and all our knowledge about it is derived from the geography of the Chinese empire, the Tay-tsing-hoei-tien, and the maps annexed to it. Though a great number of localities are indicated on it, we are unable to form any idea of the natural features of the country and its fitness for sustaining a population. Its western part is traversed by a mountain range, which near its western extremity is connected with the Altai mountains, not far from the eastern banks of the Irtish river, a great branch of the Obi. This range, the Ektag Oöla, is commonly called on our maps the Great Altai. It seems to rise to a considerable elevation, but to disappear about 94° E. long.; for farther east only isolated mountain masses or short ranges occur in the desert. That portion of Mongolia which lies south of this range seems to partake largely of the nature of the Gobi, extending mostly in extensive sterile plains. The great number of rivers which, descending from the southern declivity of the Ektag Oöla, join the Irtish before it reaches the lake of Zaizan, seem to indicate that a tract of fertile country extends along the northern banks of that river. The Irtish is the largest river in this country, and probably runs 160 miles before it falls into lake Zaizan. Another large river, the Ooroongoo, falls into lake Kisilbash, which has no outlet. The country between the Ektag Oöla and the principal chain of the Altai mountains appears to be traversed by several subordinate ridges running east and west. Though it is much better watered than any other part of Mongolia, the greatest part of it is a desert, especially towards the east, but towards the west the tracts of pasture are more extensive and less interrupted by sandy districts. In this part there are several extensive lakes, all of which receive considerable rivers without having any outlet. The most northern is the Upsa Nor, which receives from the east a considerable river, the Tes, besides several smaller ones. The Yeke Aral Nor, to the south-south-west of the Upsa Nor, is the receptacle of the Djabekan, a river whose course can hardly be less than 500 miles. In this part Mongolia extends to the north of the Altai mountains, comprehending the country in which the upper branches of the Yenesei have their origin and course. The mountain range which divides the last-mentioned tract from the lake Upsa Nor and the river Tes is called the Tangnoo-Oöla.

This part of Mongolia is divided into two governments, the government of Kobdo and that of Uliassutai, the boundary-line between them running near 92° E. long. The capital of the former is Kobdo, not far from the northern extremity of lake Yeke Aral Nor: the capital of the latter is Uliassutai, situated on the river Iro, an affluent of the Djabekan. The latter place is stated to contain 2000 houses, and to be regularly built. Caravans pass from it to Urga and to China, and its commerce seems to be considerable. Nothing is known of Kobdo. A general, appointed by the Chinese emperor, resides in each town, a Mandshoo by birth, who has under his inspection the Mongol inhabitants of the country; he unites in his person the military and civil authority.

As the whole surface of Mongolia, with the exception of the deep depression of the Ta-Gobi, is more than 3000 feet elevated above the sea-level, and as it stretches out in vast plains, to which the comparatively low ranges of mountains along its northern border cannot afford shelter against the northern and north-eastern winds, the climate is much colder than in that part of Siberia which extends along the base of the Altai range west of lake Baikal. No month in the year is free from snow, and even frost, though the heat in summer is nearly insupportable, on account of the want of trees and the sandy surface of the country. Sudden and great changes in the temperature are of frequent occurrence. It is however remarkable that the numerous herds which pasture on this plain find subsistence all the year round: even after a fall of snow the grass is seen above it, and serves to nourish the animals. This evidently shows that the quantity of snow which falls is comparatively small, and much less than that which annually covers the northern countries of Europe or of North America. This fact is a proof of the great dryness of the air; and to this want of moisture the unfitness of the soil for agricultural purposes, even where it is not composed of sand or stones, is mainly to be attributed. A little millet is grown in a few sheltered places between high hills, which attract the moisture. Rain is rare, except near the great ranges of mountains, especially about Urga. Timkowsky observed that in the months of October and November the thermometer descended to + 10°, 0°, and − 10°, and in Urga, in January, it varied between − 30° and − 70°. Gales of wind are frequent, and, especially in the Gobi, blow with great force, and frequently for many days together.

The wealth of the Mongols consists in their numerous herds of camels, horses, and sheep. Cattle are only numerous on the more hilly tracts, especially towards the boundary of China; there are none in the Gobi. Asses and mules are only found in the vicinity of China. Wild animals are numerous, especially hares, antelopes, dshiggetais or wild asses, deer, foxes, sables, squirrels, and marmots. Waterfowl are plentiful on the numerous lakes and swampy tracts. In some places the desert is covered with small stones, among which several kinds of precious stones occur, as chalcedony, agate, onyx, jade, carnelian, &c., which are collected by the Chinese.

Inhabitants.—The inhabitants are called Mongols, and constitute the principal stock of a nation which is widely diffused over the extensive table-lands of central Asia.

This nation is divided into two great divisions, the Eastern or Proper Mongols, and the Western Mongols, or Calmucks. Of the latter an account is given under CALMUCKS. All the tribes belonging to this nation have, from time immemorial, led a nomadic life, and subsisted on the produce of their herds, without attempting to cultivate the ground; a circumstance which must be attributed to the countries they inhabit being entirely unfit for agriculture, with the exception of very small tracts.

The Proper Mongols inhabit that portion of Central Asia which is bounded by a line beginning at the most northern extremity of lake Baikal, and thence extending west-south-west to the northern extremity of lake Balcash, and thence running east-south-east to the banks of the river Hoang-ho, where the range of the Alashan rises near the town of Ninghia. From this place it follows the great wall of the Chinese empire, almost in all its extent, and from its eastern extremity it runs north-eastward to the junction of the rivers Nonni and Songari in Mandshooria, whence it returns to the northern extremity of lake Baikal. The whole country encompassed by this line is in possession of the Proper Mongols, with the exception of some plains between the Ektag Altai and lake Balcash, which are occupied by Calmuck tribes. There are however Mongols also in other parts of Asia, especially in the country about the sources of the Hoang-ho, and about lake Kookoonor, and in the western parts of Tibet, where they are called Khor-Katshi Mongols. But our information about these last-named branches of the great nation is extremely scanty, as those countries have never been visited by Europeans. All the Mongols speak the same language, and admit that they all belong to the same nation, and have a common origin.

The Proper Mongols are divided into three great nations, the Tshakhar, Khalkhas, and Sunnit. The Tshakhar inhabit the best part of Mongolia, being in possession of the tract which skirts the great Chinese wall on the north, and extends to the Ta-Gobi, a distance of from 150 to 200 miles from the wall. They obtained the full confidence of the court of Peking by yielding to the sway of the Mandshoo, before they had made any considerable progress in the conquest of China. The Khalkha or Khalkhas Mongols occupy the northern part of Mongolia, along the southern boundary of Siberia. They voluntarily submitted to the Chinese emperor, to avoid destruction in their unsuccessful war with the Oelöth Kalmucks in 1688. The Sunnit occupy the country between the Tshakhar and Khalkhas, or that part of Mongolia through which the Ta-Gobi extends. They are less numerous and powerful than their neighbours, and less esteemed by the Chinese. They submitted to the Mandshoo, when the Tshakhar joined them in 1634.

Nomadic nations have generally no literature; indeed their mode of life prevents them from having one that has originated with themselves. The Arabs and Mongols however have a literature, and they owe it to having conquered nations who had advanced much further in civilization than themselves; the Arabs to the Persians, and the Mongols to the Chinese. But as the Arabs preserved their dominion over the conquered nations for many centuries, their literature acquired a great degree of originality and extent, while that of the Mongols, who were masters of China only for a century, consists chiefly of translations of Chinese books, and a few original historical works, especially the history of their great hero, Gengis Khan. We are however very imperfectly acquainted with their literary compositions. The court of Peking takes great care to maintain a love for literature among the higher classes of the Mongols, as one of the surest means of diverting the thoughts of their princes from ambitious enterprises and from disturbing the peace of the country.

The whole nation is divided into twenty-six tribes, called *aïmak*. Each of these divisions has an hereditary prince, except the Khalkhas, who constitute one aïmak, but are governed by four hereditary princes, called *khan*. All four claim a descent from Gengis Khan. Each aïmak has its territory, in which it wanders about with its herds. The order of society resembles the feudal system, and the noblemen are called *taidshis*. The Mandshoo have introduced among them a military division, according to which the whole nation forms 135 banners, each of which is subdivided into regiments and companies. Each Mongol is bound to serve as a horseman from his eighteenth to his sixtieth year. The Mongols are governed by the decrees of the Li-fan-yuen, or Tribunal of Foreign Affairs, which has instituted for them a civil government, resident at Urga, and two military governments, at Uliassutai and Kobdo. All their princes are obliged to pay a fixed tribute as a token of their dependency, but it is small, and they receive ten times its amount back in presents, given to them as a remuneration for their services and fidelity. A few receive even a fixed salary. Some of their princes also are always married to a princess of the imperial blood, and thus are more closely attached to the interests of the emperor. By these means the court of Peking keeps the unruly and warlike temper of this nation in subjection, in which it is powerfully supported by the indelible hatred which the Mongols bear to the Chinese. It is therefore probable that if the Chinese should rise in rebellion against the Mandshoo, their present masters, the latter would be supported by all the Mongols in maintaining their present ground.

According to a rough estimate, it is thought that this nation, after having lived in peace for more than a century, can bring to the field 500,000 warriors; and as each male is a warrior, it is presumed that the whole population does not much exceed two millions.

(Timkowsky, *Voyage à Peking*, &c.; Pallas's *Travels through Russia*; Klaproth's *Asia Polyglotta*; Staunton's *Account of an Embassy to China*; M'Leod's *Narrative of a Voyage to the Yellow Sea*; Ritter's *Erdkunde von Asien*, i. and ii.)

MONGOLS and TARTARS have been so constantly confounded by former writers, that even in modern times, although the vague denominations of Great Mongolia and Tartary have disappeared from our maps, much confusion still prevails about the history and geography of these two nations, who are however distinguished from each other by a strongly-marked physical and moral character. The vast plateaus and plains of Central Asia are occupied by four great branches of the human species, by the Tunguse and Tibetan races, and the innumerable Mongol and Tartar, or, more properly speaking, Turki

tribes. The last-mentioned people, whose number may be estimated at nearly three millions, are widely scattered, from the shores of the Caspian Sea to the Russian provinces of Kasan and Astrachan, and to the inhospitable tracts of Siberia, and even beyond that mountain range, the southern declivities of which are principally inhabited by the Turkomans, or those Turki tribes from whom the European Turks, or Osmanlis, are descended. Some of the northern clans, and particularly those which are subject to the Russian government, have settled in towns and villages, and have engaged in trade, cattle-breeding, and agriculture. On the south side of Mount Caucasus numerous Tartar tribes, who travel in summer towards the hills, and in winter descend with their flocks to the warmer regions of the plains, live alternately in tents and moveable habitations; but the greater part of them resemble in many respects the Arabian Beduins, have no fixed residence, wander over an immense extent of country, and lead a roving pastoral life, being occasionally engaged in hostile excursions and predatory quarrels. Personally they are a noble and intrepid race, and though animated by fierce passions and addicted to plunder and robbery, they are nevertheless careful observers of the duties of hospitality, and rarely shed blood, unless strongly provoked. (Leyden's learned *Introduction to the Memoirs of Baber*, London, 1826.) With the exception of the religion of Mohammed, there is no common tie among the numerous independent clans, which are distinguished by the Turkish denomination of hordes or encampments, such as the Nogai, Usbek, Kirgise, and Turkoman hordes. But they are all distinguished by the same striking features of the finely-formed and light-coloured Caucasian family to which they belong; whereas the Mongols are characterised by a short stature, dark yellow colour, flat nose, strong cheek-bones, large and prominent ears, and by the almost complete absence of beard. The Mongol race, which is far more numerous than the Tartar, is dispersed over almost all the eastern countries of Asia; but it is to the restless hordes of middle Asia, and to the Buriates, Bashkirs, Kalmuks, and other roving tribes, that the name of Mongols is chiefly restricted. Addicted to the same nomadic manner of life, and equally fond of horse and cattle breeding with the Tartars, they wander in quest of pasturage over their boundless plains, carrying with them their whole stock of property, and even their houses, which are placed upon wheels and drawn by oxen. Thus they leave scarcely a trace of their former residence in the places which they abandon. Contending for temporary pasture-grounds, or propelled by urgent necessity, those innumerable crowds of Mongols, though naturally fainthearted and cowardly, have often invaded the neighbouring countries.

The Scythians of old, who devastated, in the sixth century before Christ, the provinces of Media and Persia, even as far as the frontiers of Palestine, were undoubtedly Mongols (Herodot., i. 103; iv. 23; *Jeremiah*, v. 15; vi. 1; vii. 3), who afterwards, under the name of Huns and under the command of the fierce Attila, made considerable progress into Europe, ravaging the country like a host of hungry locusts, and conquering rather by their overwhelming numbers than by any regular warfare. (Ammianus Marcell., xxxi. 2; Jornandes, *De Rebus Goth.*, 35.) The Huns appear even on an antient Indian inscription (*Asiatic Researches*, i. 131); but the 'White Huns' mentioned by Cosmas Indicopleustes are probably Turki tribes, or those Scythians (Sâkas) whom King Vikramâditya expelled from India in the fifty-sixth year before our æra. The distinctive names of Mongols and Tartars did not become known until after the conquests of Gengis Khan, who honoured his Mongols with the pompous title of *Koekas Monghoel*, or 'celestial people;' whereas the conquered Turki hordes were called tributaries, or *Tatars*, as the word should be more correctly written. Although the main body of the soldiers, as well as the immediate successors of Gengis Khan, were decidedly Mongols, it is from that time that the name of the more courageous and spirited Tartars has been indiscriminately and arbitrarily applied to those Asiatic conquerors. (F. F. Schmidt, *Forschungen im Gebiete der Geschichte der Mongolen*, pp. 5, 39, 50.) Gengis Khan, born in 1163, became the chief of a petty Mongol clan in the thirteenth year of his age, and having first overcome the neighbouring hordes, he soon united the numerous wandering tribes into a conquering nation, and successively subdued the greatest part of Asia. His son Oktai followed him under the title of Great Khan, and was equally successful. In their expeditions to the west the Mongol armies, or, properly speaking, their hosts of robbers, advanced even to Hungary and Silesia; so that after the dreadful battle of Wahlstadt (A.D. 1241) the Mongol empire extended from the northern provinces of China to the frontiers of Poland and Germany. The Mongols (Khalkhas), under their khan Kublai, conquered all China, and remained in possession of that country for a century. In the course of the thirteenth century this vast empire gradually split into several independent sovereignties, till it was once more united, and even considerably enlarged in the direction of Hindustan, by that bloody conqueror of the Djaggatai Turki race, the famous Timur Begh, or Tamerlan, after whose brilliant career (1335-1405), the Mongol empire slowly dissolved. In the year 1519 a lineal descendant of Timur, Zehireddin Mohammed Baber, founded a new monarchy in Hindustan, erroneously called the Mogul empire. Being himself of Turki origin, Baber not only wrote his interesting 'Memoirs' in the purest Turki dialect, but often censures in the strongest terms the depravity, perfidy, venal character, and cowardice of the Mongols.

For the further history of the Mongol and Tartar tribes, see Abulghasi Behadurkhan, *Historia Mongolorum et Tatarorum*, Casan, 1825; Hüllmann, *Geschichte der Mongolen*, Berlin, 1796.

MONGOOSE, or MONGOOZ, one of the names of a species of Macauco, *Lemur Mongoz*, Linn.

MONIMIA'CEÆ constitute a little-known natural order of plants, whose most striking distinction consists in the flowers being naked and collected together into involucra, some male and some female; the male involucra having their inner surface thickly covered with numerous stamens; the female including several carpels, each of which has a single ovule in its interior. The species are very few in number, and in all cases are South American woody plants, shrubs, or trees, with fragrant aromatic secretions. Their real affinity is unsettled; if the prevailing opinion as to their structure is correct, they must be regarded as near allies of Urticaceæ; but if what is now called the involucre should be shown to be a calyx, as it was considered, till Brown suggested the contrary, they will take their station near Lauraceæ, with which their aromatic qualities assimilate them



Monimia rotundifolia.

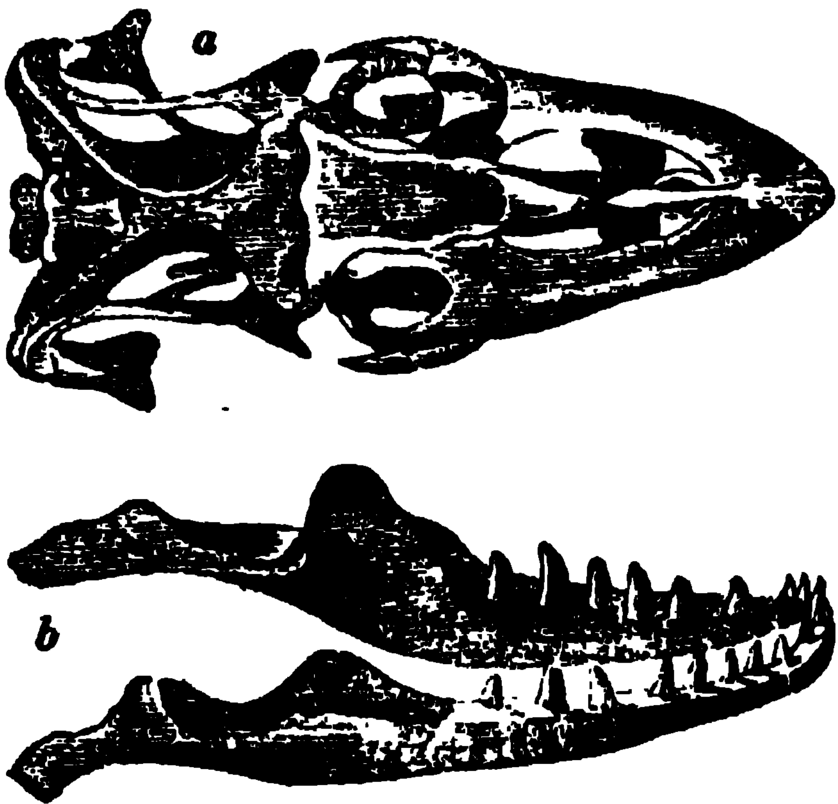
1, a male involucre; 2, a female involucre; 3, the last cut open to show the carpels; 4, a ripe fruit; 5, a view of the ripe carpels contained in the latter, the involucrum being partly cut away.

MO'NITORS, the name given to some Lacertian Reptiles, in consequence of the supposed warning given by them

of the vicinity of crocodiles. The warning of these *Monitory Lizards* was said to be a hissing or whistling; but the better opinion is, that they obtained credit for this monition solely from the accident of their haunts, which are for the most part in the neighbourhood of the waters, and consequently bring them sometimes into company with the destructive and gigantic reptiles above mentioned.

The *Monitors* have teeth in both jaws, but none on the palate. Cuvier divides them into two groups [LACERTIADÆ], and Fitzinger into three, under the names of *Tupinambis*, *Varanus*, and *Psammosaurus*. Mr. Gray makes the *Monitoridæ* the second section of his *Leptoglossæ*, or Slender-tongued Lizards. (*Zool. Proc.*, 1837.) The true Monitors are protected by small and numerous scales on the head, the limbs, under the belly, and round the tail, which is carinated above, the keel being formed by a double row of projecting scales. Thighs without any row of pores.

Geographical Distribution.—The Old Continent.



a, skull of Monitor Niloticus, seen from above; *b*, under-jaw of same.

The Monitor of the Nile (*Lacerta Nilotica*, Linn., *Tupinambis Niloticus*, Geoff., *Ouaran* of the Arabs) will serve as an example of these Lizards.

Description.—The teeth of this species are conical and strong, and the posterior ones become rounded with age. The colour is brown, with paler and deeper dots, forming ocellated compartments, which become rings on the tail and obscure stripes on the limbs. The tail, which is rounded at its base, is carinated above, though not strongly, nearly throughout. Length from five to six feet.



Monitor Niloticus.

Locality.—Egypt; where the modern Egyptians have a fable that the animal is a young crocodile which has been hatched on dry land—as indeed all young crocodiles are—but they mean, we suppose, to convey the idea that it is a dwindled and neglected offspring. The species is to be found on the monuments of the antient Egyptians, probably on account of its devouring the eggs of the crocodile.

The great fossil Lizard [MEGALOSAURUS] appears to have partaken of the structure of the Monitors and the Crocodiles. The *Mosasaurus* was also very nearly allied to the Monitory Lizards. [MOSASAURUS.] An account of the dissection, by Mr. Martin, of a *Monitor* that died at the Gardens of the Zoological Society in the Regent's Park, in 1831, will be found in the Proceedings of the Society for that year.

MONK. In England, before the Reformation, a person who 'entered and professed in religion,' as the phrase was, from that time was considered, for all legal purposes, to be dead. Littleton (§ 200) says, 'When a man entreth into religion and is professed, he is dead in the law, and his son or next cousin (consanguineous) incontinent shall inherit him, as well as though he were dead indeed. And when he entreth into religion, he may make his testament and his executors; and they may have an action of debt due to him before his entry into religion, or any other action that executors may have, as if he were dead indeed. And if that he make no executors when he entreth into religion, then the ordinary may commit the administration of his goods to others, as if he were dead indeed.' It was a consequence of this legal notion of a civil death, that if a lease was made to a man for the life of another person, and this other person professed in religion, the lease determined; and for this reason such a lease was always made for the *natural* life of any person on the continuance of whose life the lease was to depend; and this phraseology is still maintained in legal instruments. (Co. 2, *Rep.* 48.)

All Regulars, that is, those who vowed obedience, chastity, and poverty, entered some house of religion, where they professed. Bare admittance into such a house was an entry into religion; but the person was not professed till the year of probation was expired, and he had taken the habit of his order and made the vows above mentioned.

By the 27 Hen. VIII., c. 28, all monasteries, priories, and other religious houses of monks, canons, and nuns, of whatever habit, rule, or order, not having lands, rents, or other hereditaments above the value of 200*l.* per annum, and all their manors and lands, were given to the king and his heirs for ever. The act declared that the king should have and enjoy, according to the act, the actual and real possession of such religious houses as were comprehended within it, and might give, grant, or dispose of them at his will and pleasure, to the honour of God and the wealth of the realm. The act of the 31st Henry VIII., c. 13, was still more comprehensive. By the 1st Ed. VI., c. 14 (which recites the 37th Henry VIII., c. 4), all colleges, free chapels, and chantries, and all manors, lands, or hereditaments belonging to them, or which had been given or assigned to the finding of any priest, or of any anniversary or obit, or any light or lamp, to have continuance for ever, were given to the king and his heirs and successors.

It should be observed that these acts did not affect ecclesiastical bodies or persons, simply as such; that is, they did not affect the secular clergy, such as archbishops, bishops, deans and chapters, prebendaries, archdeacons, parsons, and vicars; but only the regular clergy. It was decided in the archbishop of Canterbury's case (Co. 2, *Rep.* 48), that no ecclesiastical house, unless it was also religious, was within the act of 31 Henry VIII. These acts however completely put an end to all the houses of regular clergy within the realm; and on the occasion of carrying into effect the statute of Edward VI., a great many grammar-schools and other charities which did not come within the provisions of the act were also suppressed. 'This act,' says Strype, 'was soon after grossly abused, as the act in the former king's reign for dissolving religious houses was. For though the public good was pretended thereby (and intended too, I hope) yet private men, in truth, had most of the benefit, and the king and commonwealth, the state of learning, and the condition of the poor, left as they were before or worse.' (Strype's *Ecclesiastical Memoirs*, ii. 101-103, 423, and iii. 461, where there is a catalogue of King Edward's free grammar-schools, which were endowed for the most part out of the charity lands given to the king by the said act for this and other like purposes.)

MONK, GEORGE, Duke of Albemarle, second son of Sir Thomas Monk of Potheridge, in the parish of Merton, in Devonshire, was born on the 6th of December, 1608. His father's estate was much encumbered, and his circumstances so distressed, that when Charles I. visited Plymouth to inspect the equipment of a Spanish expedition, he was afraid of joining the gentlemen of the county who were desirous of assembling round the king, on account of the menaces of a creditor who threatened to arrest him. George Monk was despatched to offer the under-sheriff money to delay the execution of the warrant. 'The under-sheriff accepted the money, promised what was asked, and a few days after, paid doubtless on the other side, caused Sir Thomas to be publicly arrested in the midst of the gentlemen assembled on the king's way.' (*Memoirs of Monk*, by M. Guizot, translation, p. 5.) This circumstance had an immediate influence on young Monk's life: he dealt so violently with the treacherous under-sheriff, that it became prudent for him to leave England. Sir Richard Greenville,

his relative, was on the point of sailing on a cruise before Cadiz, and he embarked with him as a volunteer. Upon the failure of this expedition, he enlisted during the following year in the equally unsuccessful attempt on the Isle of Rhé. Soon after his return from the Isle of Rhé he entered the service of Holland: 'Germany and the Low Countries were at this period the resort of those young Englishmen whose taste or the state of whose fortunes drove them to the profession of arms. He returned to England about the thirtieth year of his age, when the first Scotch war began, enlisted in the king's army, and obtained the rank of lieutenant-colonel in Lord Newport's regiment.' (Skinner's *Life of Monk*.) The conduct of the war, and the manner in which it was concluded, made him discontented and inclined to emigrate to Madagascar; but he abandoned the scheme, and was appointed colonel of Lord Leicester's troops sent to quell the Irish rebellion (1642). In the irregular warfare that followed he had considerable success, his power being augmented by the devoted attachment of his troops: there was not, it was said, a soldier ever so sick or so ill shod, who would not make an effort to follow George Monk. When the civil war began, these troops were recalled, and Monk, being suspected of favouring the parliament, was sent under a strong military guard to Bristol. Lord Hawley, the governor of the town, passed him on parole to the king; and the king, satisfied with his professions, permitted him to rejoin his troops, which had reached England, and were engaged in the siege of Nantwich. At Nantwich he was defeated by Fairfax (January, 1644), was taken prisoner, and, after some delay, confined in the Tower of London. During the two years that he suffered the miseries of imprisonment aggravated by excessive poverty, events pursued their course; the king became a prisoner, and the civil war ceased. His known abilities made him now desirable as a partisan. The parliament actively strove to gain him, and at length, overcome by persuasion and gifts of money (Clarendon, vii. 362), he forsook his party, which was no longer in a condition in which he could serve it, and 'quitted his prison to serve the parliament, leaving in the Tower the royalists, his companions in adversity, who never ceased to flatter themselves that he would prove one day useful to the king in England.' (Guizot, 39.)

Monk was now sent to Ireland to command in Ulster, where he served his new masters greatly to their satisfaction, leaving only one cause for censure, a league with the rebel O'Neill. He had gained the confidence of Cromwell, who determined, on account of his military talents, to make him general of the ordnance, and to provide him a regiment with which he might accompany him in the meditated Scotch campaign. In this service Monk distinguished himself at Dunbar, and was left by Cromwell with 6000 men to complete the reduction of Scotland. It is in this campaign that he is accused of having in cold blood put to death the governor of Dundee and 800 of the garrison. After a short residence at Bath for the benefit of his health, he returned to Scotland (1652) with other commissioners to promote the union of the two nations. Fresh and novel services were soon required of him. He was associated with Blake and Dean in the command of the fleet which was engaged in the war against Holland. Two engagements took place, in both of which the English were victorious: Van Tromp, the Dutch admiral, was killed, and his fleet damaged and dispersed. After being rewarded with many honours at the hands of Cromwell and the parliament, he resumed the command in Scotland, where fresh troubles had broken out.

Before we proceed further with the account of Monk's public acts we must mention some occurrences in his private history, by which his condition was immediately affected. These are, the death of his father, which occurred before his imprisonment; the subsequent death of his elder brother without male heirs; his succession to the family estates, which he soon relieved from their embarrassments; and his marriage. When this last event took place it is difficult to ascertain, but it was not acknowledged until 1653, though asserted to have been previously solemnised. His wife was Anne Clarges, the sister of Dr. Thomas Clarges, a physician, a vulgar imperious woman who had previously cohabited with him. 'She was a woman,' says Lord Clarendon (who must however be pointed out as Monk's assiduous detractor), 'Nihil muliebre præter corpus gerens;' a person 'of the lowest extraction, without either wit or beauty.' (*Hist. Rebel.*, vii. 383.) The pressing solicitations of the lady, and the probable or actual birth of a child, gained Monk's consent to the union.

It was in April, 1654, after all these circumstances connected with his private history had taken place, that Monk, under the orders of the Protector, marched northwards with the most restless and fanatical portion of the army. He had to contend with Lord Middleton, with whom the royalists had risen in the Highlands, and the people generally, who were discontented and ready for rebellion. His vigilance and activity were remarkable.

'The country submitted; the army did not quit it, till it had, by means of a certain number of garrisons, secured the payment of taxes, which the Highlanders had hitherto thought they could refuse with impunity; and order was established in those sanctuaries of plunder, with such effect, that the owner of a strayed horse, it is said, recovered it in the country by means of a crier.' (Guizot, p. 80.) In the autumn he returned to Edinburgh. For five years his residence was at Dalkeith, where he was 'ever engaged in business, or in his planting, which he loved as an amusement and occupation; he gave access to every one; listened to everything; had a language for all conditions, all ranks, and all parties; kept himself well informed on all subjects; and ascertaining what he might have to fear or to promote, directed by his own personal knowledge the numerous spies whose reports never missed his ears or hands.' Monk, who was (1655) one of the commissioners for the government of Scotland, now stood in a very curious position: for though he was the agent and confidant of Cromwell, he was also the hope and favourite of the royalists. It was always his care in advocating the cause of one party to give as little offence as possible to that to which he was opposed. That he might not commit himself, he was silent when speaking was not absolutely necessary; when he was forced to speak, he did so with caution and artful duplicity. A letter which the king wrote to him expressive of confidence, Monk forwarded to Cromwell; but notwithstanding this apparent devotion, the Protector feared him, and used various expedients for neutralising his power. (Guizot, translator's note, p. 91.) After Oliver Cromwell's death, when Richard Cromwell was proclaimed Protector in Edinburgh, many exclaimed, in allusion to Monk, 'Why not rather "Old George?"' but Monk would neither assume the power nor attach himself to any party. The new Protector's friends offered him 20,000*l.* a year for his support; but, avaricious as he was, he would make no engagement: his policy was to render himself an object of importance to all parties, and through his duplicity he succeeded in being treated with by all. When at length circumstances compelled him to act, he declared for the parliament against the army, and decided upon marching to London. There were many, even at the time when he thus declared himself, who altogether discredited his sincerity, and believed him to be at heart a royalist, seeking to restore the king as soon as it might be done with safety: and there is reason to suppose that he had already determined to promote the Restoration. We give Mr. Hallam's opinion on this point. (*Const. Hist.*, ii. 384.)

'I incline, upon the whole, to believe that Monk, not accustomed to respect the Rump parliament, and incapable, both by his temperament and by the course of his life, of any enthusiasm for the name of liberty, had satisfied himself as to the expediency of the king's restoration from the time that the Cromwells had sunk below his power to assist them; though his projects were still subservient to his own security, which he was resolved not to forfeit by any premature declaration or unsuccessful enterprise.' The power of Lambert and the army was now rapidly demolished. Fairfax, the city of London, the fleet, and the governor of Portsmouth, all declared against them, and Monk's party gained the ascendency in Ireland. Every office and every command Monk filled with friends whom he could trust; it was observed that many of these persons were royalists, yet Monk still persevered in protesting for the parliament and a commonwealth. The expectation of the Restoration was somewhat general, but, if there were any, the number was small who suspected through whose agency it would be brought to pass.

When Monk arrived in London he was lodged in the apartments of the prince of Wales. He addressed the parliament, was invited to occupy his place there, was made a member of the council of state, and charged with the executive power. With his usual address, he continued to use the power of his army as a means of awing parliament,

and the assertion of duty owed to the parliament as a means of controlling his army. At length the 'Rump' became so unpopular, and the cries for a free parliament so loud, that the city of London refused the payment of taxes. Monk obeyed an order from the parliament to march into the city and subdue it: but his subservience to them did not last long. He sent them a letter, 'probably the harshest ever received by that parliament, so used to insults' (Guizot, 205), ordering them immediately to fill up the vacant seats, fixing a time for their dissolution, and the 6th of May for the election of a new and free parliament. The restored members appointed him general of the forces of England, Scotland, and Ireland; and the republicans, as a last resource, listened to his continued protestations against the king, the House of Lords, and the bishops, and allied themselves to him. Every day his personal power increased; he was offered the protectorate, which he declined; continuing the line of conduct he had always followed, 'that is to say, steadfast in varying his language according to the individual —he gave no handle to any definite opinions with respect to himself.' The expectation of the Restoration daily increased, and some indications in the conduct of Monk, who was gradually dismissing persons and removing objects that might prove obnoxious to the king, showed plainly that the event was not far distant.

At length the farce was brought to a close. Monk received Sir John Greenville, the king's messenger, and having read the despatches, and agreed to his return, directed the manner in which he wished it to be brought about. The king, by Monk's advice, went from Brussels to Breda, and Sir John Greenville, on the 1st of May, returned with letters to the new parliament drawn up as Monk desired, and the king was immediately acknowledged and proclaimed. On the 23rd of May, Monk received him on the beach at Dover, was embraced by him, and addressed with great affection. He had a grant of money, together with many offices and titles, of which the principal was the duke of Albemarle. (Guizot, 281.)

After the restoration Monk resided principally in London, with his wife, who was the laughing-stock of the court, and gave general disgust. (Pepys, iii., 75, &c.) In 1664 Monk presided at the Admiralty. In 1665, when, on account of the plague, the court left London, he governed the city, braved all danger, and, as far as he was able, provided for all exigencies and quelled all confusion. In 1666 he commanded the fleet with Prince Rupert, engaged the Dutch, and gained credit for his courage. On his return his health failed, and he died of dropsy on the 3rd of January, 1670. He was buried in Westminster Abbey, in Henry VII.'s chapel: the king attended the funeral. He was succeeded in his titles by Christopher his son, who married Lady Elizabeth Cavendish, granddaughter of the duke of Newcastle, and died childless.

Monk had considerable capacity for civil as well as military government: the former he proved in Scotland, the latter in all his campaigns. He had the faculty of gaining the good-will and confidence of the troops and sailors that he commanded, with whom no man was more popular than 'Old George.' He had a remarkable power of advancing his fortunes with the prevailing party, without giving offence to those that might supplant them. He was silent and cautious, shrewd and phlegmatic: he was profoundly skilled in dissimulation, ever dissembling, treacherous, and false. 'He was a man capable of great things,' says M. Guizot, 'though he had no greatness of soul.'

(Guizot's *Memoirs of Monk*, ably edited by Mr. Stuart Wortley; Skinner's *Life of Monk*; Maseres' *Tracts*; Pepys's and Evelyn's *Memoirs*; Hallam's *Const. Hist.*)

MONKEY, the name usually applied to those forms among the *Simiadæ* which possess a tail.

MONMOUTH, Duke of. [CHARLES II.; JAMES II.]

MONMOUTH, the capital town of the county of the same name, is situated at the confluence of the Wye and Munnow, in the hundred of Skenfrith, about 129 miles west-north-west of London. The population amounted in 1831 to 4916.

The town is comprehended in the parish of St. Mary's, from which a portion called St. Thomas's has of late years been separated for ecclesiastical purposes, and appropriated to the antient church of that name.

From the coincidence of the position of Monmouth with that called 'Blestium' in the antient Itineraries, it is generally supposed to be the site of that station. From historical record it appears that Monmouth in early times was occupied by the Saxons, who fortified it to maintain their conquests between the Severn and the Wye, and to prevent the incursions of the Welsh. The town has been surrounded by walls and a moat on the sides which are not protected by the river; four gates, the moat, and portions of the walls existed in Leland's time; one gate still remains; the walls have been entirely demolished, and only a small part of the moat can be traced. The ruins of the castle, which stands on an eminence above the Munnow, are from some situations concealed by more modern buildings. It is said by Camden to have been constructed by John of Monmouth, in the reign of Henry III., which may be in substance correct, although, in the account of Herefordshire given in Domesday Book, a castle at Monmouth is mentioned to have been then held for the king by William Fitz-Baderon. A list of the successive proprietors is given by Mr. Coxe (*Hist. Mon.*, p. 305): it was the favourite residence of John of Gaunt, of his son Henry Bolingbroke, afterwards Henry IV.; and the birth-place of Henry V., who was thence called Harry of Monmouth. The castle of Monmouth, as a parcel of the duchy of Lancaster, was inherited by Henry VI. Edward IV., in the fifth year of his reign, granted it to William lord Herbert, who afterwards became the earl of Pembroke; but it again reverted to the crown, and was possessed by Henry VII. and several of his successors. At what time it was alienated from the duchy of Lancaster and became private property has not been precisely ascertained. The duke of Beaufort is the present proprietor.

The borough is divided into the four following wards: Castle Bailey, Wye-bridge, Munnow Street, and Over Munnow. The bulk of the population resides within its limits. There are four charters of incorporation, all of which are considered as governing charters. They were granted—the first by Edward VI., in 1550; the second by Philip and Mary, in 1557; the third by James I., in 1606; and the fourth by Charles II., in 1666. The mayor and capital burgesses are the governing body; the mayor, two bailiffs, and the recorder are magistrates for the borough.

The market is held every Saturday and the first Wednesday in each month; and there are four annual fairs; these fairs are for agricultural produce. There is no manufacture carried on here. Formerly Monmouth was celebrated for its caps, which were worn by a large portion of the population of England and Wales. Fuller, in his 'Worthies,' gives an account both of the caps and the number of persons employed in making them. Statutes were framed for the protection and encouragement of this handicraft: in the 13th of Eliz. it was enacted that these caps should be worn on sabbaths and holydays by all persons (some of worship and quality excepted), on pain of forfeiting ten groats. Shakspere mentions this article of clothing. In Henry V. (act iv., sc. 7) Fluellen says, 'The Welshmen did goot service, in a garden where leeks did grow, wearing leeks in their Monmouth caps.' An inn called the Monmouth Cap stands on the borders of the county, halfway between Abergavenny and Hereford.

MONMOUTHSHIRE, a maritime English county bordering on South Wales, is bounded on the north by Herefordshire, from which it is for the most part separated by the river Munnow; on the east by Gloucestershire and the river Wye; on the south by the Bristol Channel and the æstuary of the rivers Severn and Wye; on the west by the Ffwddog, a detached portion of Herefordshire, by Brecknockshire, and Glamorganshire. From the latter county it is divided by the river Rumney. The parish of Welsh Bicknor, a detached portion of this county, bounded by Herefordshire and the river Wye, is situated north-west of Monmouth, between that town and Ross.

Its greatest length, from a point in the Black Mountains on the north, to the mouth of the river Rumney on the south, is about twenty-eight miles. Its greatest breadth, from the Bute and Rumney iron-works on the west, to Hadnock Wood on the east, about thirty-four miles. The area is 496 square miles, or 317,440 acres. In 1831 the gross population amounted to 98,130, being an average of about 198 persons to a square mile; on comparing this amount with the similar average in each of the contiguous counties, we find, with one exception, the population of Monmouthshire to be the most dense. The population of Gloucestershire is about 307 to a square mile, Herefordshire 122, Glamorganshire 160, and Brecknockshire 63.

In extent of surface Monmouthshire is exceeded by thirty-five English and seven Welsh counties; in amount of population by thirty-six counties in England and none in Wales.

Surface.—With the exception of the southern portion, Monmouthshire is generally a hilly country. In the hundred of Wentloog a long chain, commencing with Bedwelty mountain, runs nearly unbroken to the Curtain mountain in the parish of Machen. In the same hundred is Mynydd-y-Llan, and a second range of hills immediately to the west of the river Ebbw. In the hundred of Abergavenny are the Blorenge, the picturesque Skyrrid and Sugar-loaf, a portion of the Black Mountains, and the wild elevations in the parishes of Aberystruth and Llanhileth, and to the west and north of Pontypool. The Graig forms the principal height in the hundred of Skenfrith. These are the chief though by no means the only elevations; as we have before said, a large portion of the county is irregularly hilly: the southern district must be excepted. In Caldicot and Wentloog are large tracts of land called the 'Levels' of the hundreds in which they are situated, varying from place to place in appearance and productiveness, and protected from the inroads of the sea by mounds or stone walls of many miles in length. From Caldicot Level rises the hill of Goldcliff, for an account of which we refer to the *Archæologia*, vol. v., p. 61.

The length of the coast-line from the mouth of the Wye to the mouth of the Rumney is about twenty miles; a portion of this length bounds the æstuary of the Severn, and the rest the Bristol Channel.

Rivers.—The principal rivers in this county are the Wye, the Usk, the Rumney, the Ebbw, and the Munnow.

The Wye first waters Monmouthshire at the detached portion, the parish of Welsh Bicknor, of which it forms the western and southern boundary; thence it flows a circuitous course between the counties of Hereford and Gloucester, until it reaches Hadnock Wood, in the parish of English Newton, where for a short space it divides Herefordshire and Monmouthshire; it then enters the latter county, and flowing close to the town of Monmouth, at Redbrook it again becomes the boundary of the county, and continues to be so down to its mouth. Throughout the whole of this length the Wye is navigable for barges, and sea-going vessels of considerable size work their way up to the bridge at Chepstow, whence steam-packets also ply to Bristol. The tide, which rushes with great impetuosity through the narrow entrance of this river, flows as far as Tintern; the spring-tides rise at Chepstow-bridge more fifty feet. It is the portion of this river bordering Monmouthshire that is most frequently visited by tourists; and the whole extent from Monmouth to Chepstow, whether seen from the water itself, or from the turnpike-road which follows the banks of the river, is a landscape of very remarkable beauty. The abbey of Tintern, the view from the Windcliff, and the approach to Chepstow, are the most striking features; the last is seen only from the river and the walks at Piercefield, for the road leaves the river at some distance from the town.

The Usk enters Monmouthshire about three miles west of Abergavenny, flows in the vicinity of that town, thence through the middle of the county by the towns of Usk, Caerleon, and Newport, where is the lowest bridge, until it reaches the Bristol Channel.

The Rumney first reaches Monmouthshire at its most western point, and flowing in a south-south-east direction, forms its boundary with Glamorganshire, until it falls into the Bristol Channel.

The Ebbw enters the county on the west-north-west, follows a course nearly parallel to the Rumney, and falls into the æstuary of the Usk below Newport.

The Munnow becomes the boundary of this county about a mile south of the village of Clodock in Herefordshire, separates it from that county for a considerable distance, then enters Monmouthshire about three miles north-north-west of Monmouth, passes that borough, and falls into the Wye. In addition to these rivers may be mentioned the Sirhowy, which falls into the Ebbw, the Trothy, and the Honddu, which join the Munnow, and Afon Llwyd, which falls into the Usk near Caerleon. There is good fishing in all these streams.

The want of a navigable river in the western and north-western parts of Monmouthshire, where extensive coal and iron works are carried on, has led to the formation of two important canals, communicating with the Usk at Newport. The principal canal runs north-west from Newport, has a branch to the neighbourhood of Pontypool, which it leaves to the west, runs in a north direction within a mile and a half of Abergavenny, whence it is continued to Brecknock by the vale of Usk: the whole length is between 45 and 50 miles. The second important canal is the 'Crumlin Canal,' which branches from the former between Newport and Malpas, and unites it with the village from which it is named, situated in the mining district west-south-west of Pontypool. In connection with these canals are many rail-roads—some private, and some formed by companies—having several inclined planes and tunnels of great length, on which iron and coal are conveyed from the various works.

The principal roads are, that from Chepstow by Caerwent to Newport, and thence to Cardiff, which is travelled by the Bristol and Cardiff mail; that from Chepstow to Monmouth, and so to Hereford, which is travelled by the Bristol and Hereford mail; and that from Ross through Monmouth, Raglan, and Abergavenny, to Brecon and Caermarthen, which is travelled by the Caermarthen and Gloucester and London mail.

Climate.—The climate of Monmouthshire varies greatly according to the elevation of the surface. In the vales of Wye and Usk, and many of the southern parishes, the crops are much earlier than in the northern and western portions of the county, where the narrow unsheltered valleys are swept by the winds, and subject to frequent rain, which is attracted by the neighbouring mountains. The population is generally healthy, and the average duration of life is longer than in most parts of the island.

Geology.—That part of Monmouthshire which lies east of a line drawn from Abergavenny to Newport, and prolonged thence to the Bristol Channel, is composed of the old red-sandstone formation, which is largely developed in the neighbouring counties of Hereford and Brecknock. At Chepstow, a tongue of carboniferous limestone, from the coal-basin of the forest of Dean, runs into Monmouthshire, and is bordered on the south by a strip of new red-sandstone, which forms the shore of the Severn. Close to Usk the strata of the old red-sandstone have been pierced by the underlying rocks (the Caradoc sandstone, Wenlock limestone, and Ludlow rocks of Murchison), which form an oblong district in the midst of the old red-sandstone formation.

That part of Monmouthshire which lies to the west of the line which we have described above, consists, for the most part, of the coal-measures of the South Welsh coal-field, skirted by a narrow band of carboniferous limestone. The geology of this county is fully described in the recent splendid work of Mr. Murchison, entitled 'The Silurian System,' London, 1839, 2 vols. 4to. (See chap. 12, 13, 14, and 15, and particularly chap. 23, on the Usk valley of elevation. For a description of the carboniferous system of Monmouthshire, see also a memoir by Dr. Buckland and Mr. Conybeare, in the *Geological Transactions*, second series, vol. i., p. 210-316.)

Agriculture.—The agriculture of this county varies according to the districts. In the mountainous portion on the north-west little wheat is grown; oats and barley form the principal grain crops. The Glamorganshire breed of cattle and small hill sheep prevail, the system of farming being very similar to that generally practised in the hilly parts of South Wales. In the fertile vale of Usk, the vale of Wye, and the northern and eastern districts generally, the agriculture is very similar to that of Herefordshire. Short-horned cattle have been introduced at Tredegar by Sir Charles Morgan, but they have not extended widely, and the Herefordshire breed is prevalent. Orchards are seen in favourable situations; the hills are also frequently covered with oak-coppice. The southern district, bordering the Bristol Channel, consists of an alluvial tract, in which three qualities of soil are found, a black and sterile peat, and a light and a heavier clayey loam; the lightest of these soils is productive either as pasture or meadow or under tillage.

Political Divisions.—Monmouthshire is divided into the six following hundreds: Abergavenny, Caldecot, Raglan, Skenfrith, Usk, and Wentloog; which contain 123 parishes, and eight market-towns. 1. Abergavenny is situated in the hundred of the same name, near the banks of the Usk, in the northern portion of the county. It is distant from London 145 miles, from Monmouth 16, and from Hereford 24. The market, which is considerable on account of the neighbouring iron and coal works, is held on Tuesday and Saturday. [ABERGAVENNY.] 2. Caerleon, in the south

of the hundred of Usk, stands upon the right bank of the river, from which that hundred takes its name, about five miles north-east of Newport. In consequence of its neighbourhood to the thriving port of Newport, its trade has diminished, and the place become of little importance. The market, which is inconsiderable, is held on Thursday. 3. Chepstow is beautifully situated in the hundred of Caldecot, near the mouth of the Wye. It is distant from London 133 miles, from Newport 16, and from Monmouth 16. [Chepstow.] 4. Monmouth. 5. Newport holds an important situation near the mouth of the Usk, in the hundred of Wentloog. In association with the boroughs of Monmouth and Usk, it returns one member to parliament. The governing charter was granted in the twenty-first year of James I.; the mayor and thirteen aldermen form the governing body; of the aldermen, who are elected for life, the two seniors are magistrates for the borough. The limits of the borough, which formerly did not comprise the whole mass of the population, were extended at the time of the Reform Act. The town is well lighted and supplied with water, but indifferently paved and cleansed. It was once surrounded by walls, of which no vestiges remain. Three gates are mentioned by Leland to have existed in his time; the sites of two of these may still be traced. The castle, the remains of which have been converted into a brewery, was probably built by Robert, Earl of Gloucester and Bristol, the natural son of Henry I. (Coxe's *Monmouthshire*, i., p. 50.) During the present century this town has progressively and rapidly increased in wealth and population. The population of Newport and St. Woollos was, in 1831, males, *3500*; females, *3562* : total *7062*.

The port of Newport comprises the whole of the river Usk between Caerleon and a line drawn from Redwick Pill on the Severn, to the mouth of the Rumney river. The port dues are, for every sloop under 20 tons, 4*d.*; for every sloop above 20 tons, 8*d.*; for a schooner or brig, 2*s.*; for a ship or bark, 3*s.*

The exports consist principally of coal, iron, bark, and oak timber; the importations, of foreign timber and Irish provisions. The number of vessels engaged in foreign, bears a very small proportion to the number engaged in coasting trade. The export of coals, which in 1800 was 18,375 tons, in 1833 amounted to 470,339 tons. The following table shows the amount of trade carried on in this port.

	Vessels cleared in.	Vessels cleared out.
1825	910	6285
1832	1030	7909
1834	1134	7588
1837	1393	7482

The gross amount of customs-duty received in 1834 was 5578*l.*; in 1835, 6709*l.*; in 1836, 11,183*l.*

Much inconvenience has hitherto been experienced on account of the insufficient accommodation of this port; vessels lying and being laden in the mud. A company has lately (1838) been formed for the purpose of building docks, which will tend to facilitate and increase trade. Newport is distant from London 149 miles, from Chepstow 16, from Cardiff 12. Markets are held on Wednesday and Saturday.

6. Pontypool, a thriving town on the southern border of the hundred of Abergavenny, stands on the Afon Llwyd, immediately to the east of the wild mountainous district in which many of the principal collieries and iron-works are situated. Pontypool is distant from Usk 7 miles, from Newport 9, and from London 148. The market is on Saturday. 7. Tredegar is situated in the parish of Bedwelty, in the upper division of the hundred of Wentloog. The activity of the neighbouring mining district has caused so rapid an increase of the population, that it has been found desirable to erect a market-house here, and to hold a market every Saturday. Many houses have lately been built, and a town formed here; there is a church, and places of worship for Wesleyans and Baptists. Tredegar is 21 miles from Newport, and 12 miles from Abergavenny. 8. Usk is situated in the hundred and on the river of the same name; it is a borough, contributing with Monmouth and Newport to the election of a member of parliament. The lord of the manor of Usk is also lord of the borough, in which capacity he appoints the recorder. There are within the borough a portreeve (nominated and elected annually by the burgesses), a recorder, two bailiffs, and an indefinite number of burgesses. Usk is distant from Monmouth 12 miles, and from London 141 miles.

Caerwent, a Roman station of considerable importance, and afterwards a town, has now become an inconsiderable village. An account of such of its antiquities as are worthy of notice is given in the *Archæologia*, and in Coxe's *Monmouthshire*, vol. i., p. 24.

Minerals and Mining Industry.—The important minerals in this county are coal, limestone, and iron-stone. The South Welsh coal-field, as it is generally called, occupies a western portion of this county.

There are 12 beds of coal, varying from three to nine feet thick, and whose aggregate thickness is about 95 feet; the principal strata lie at a considerable depth, but as the district is intersected with deep valleys, the expense of sinking shafts is avoided, levels being driven into the side of the hills. These levels form the ingress and egress to the mines, and are furnished with iron-roads for greater facility of transit. The coal may be divided into two kinds, furnace-coal and stone-coal. For an analysis of them, and general information respecting this coal-field, see Coal. Limestone, which skirts the coal-field, and is likewise found, as we have stated in our remarks on the geology of this county, in the neighbourhood of Chepstow, is burnt extensively for building purposes and manure, and is used in large quantities in the manufacture of iron. Being broken into small pieces, that it may mix more intimately with the mine and coke, it becomes a flux, combines with the clayey portion of the ore, and forms with it a fusible compound which runs off below in a slag or cinder. In the selection of limestone for this purpose, those beds are preferred which contain the smallest proportion of magnesia. It is reckoned that about a ton of limestone is required for the manufacture of every ton of iron.

The iron-stone of this district is an argillaceous ore, occurring sometimes in strata, sometimes in detached lumps or balls; the proportion of iron contained in it varies from 18 to 55 per cent.: from 30 to 35 per cent. may be considered not a bad average throughout a work. Carbonic acid and clay enter largely into the composition of the ore; and water, sulphur, silex, and perhaps a little arsenic, complete the list of ingredients. The iron-works of Monmouthshire and South Wales are comprised in a range of country of about 25 miles from one extremity to the other, stretching in the direction of north-west and south-east. The works at Hirwain in Brecknockshire, and Aberdare in Glamorganshire, form the extreme points to the westward. Then comes Merthyr Tidvil with its important works, the focus, as it were, of the manufacture; and from Merthyr there is a continued line of furnaces formed by the works at Dowlais, Romney, Tredegar, Howey, Beaufort, Nant-y-Glo, Blaenafon, the Varteg, Abersychan, and Pontypool, which terminates the mineral range in that direction. Such is the demand for iron at this time (1839), that all available furnaces are in blast, and many new ones in course of erection. Under the head Iron will be found an account of the iron manufacture in Monmouthshire and South Wales, and a more detailed account in the valuable number of the *Library of Useful Knowledge*, entitled 'Manufacture of Iron,' from which these remarks have been extracted. See also a prize essay *On the Mineral Basin of South Wales*, by Mr. Booker (London, and Cardiff).

Political and Ecclesiastical Divisions.—Monmouthshire is divided into four deaneries, Abergavenny, Netherwent, Newport, and Usk. It is in the province of Canterbury, and, with the exception of four parishes, in the diocese of Llandaff. The parish of St. Mary's, Monmouth, is in the diocese of Hereford; those of Cwmyoy, Oldcastle, and Llanthony, in the diocese of St. David's. The benefices are generally of very small value, the greater proportion producing annually less than 120*l.*; the principal are—

		£	Patron.
Abergavenny,	Vicarage	451	C. K. Tynte, Esq.
Llangibby,	Rectory	477	W. A. Williams, Esq.
Llanover with Mamhilad and Trevethen chapelries	Vicarage,	591	Chapter of Llandaff.
Llanvair-Kilgidin,	Rectory	395	Sir Charles Morgan.
Mitchel Troy with Cwmcarvan	Rectory.	398	Duke of Beaufort.
Portscwit with St. Pierre and Sudbrook	Rectories.	432	Charles Lewis, Esq.
Trelleck with Penalt	Vicarage.	430	The King as Duke of Cornwall.

The churches are generally very small and frequently of Norman architecture, of which Malpas offers a good specimen.

Two members of parliament are returned for the county; the polling-places are, Monmouth, Abergavenny, Usk, Newport, and the Rock Inn in the Parish of Bedwelty: Monmouth is the place of election. The assizes are held at Monmouth by the judges on the Oxford circuit, in their route from Hereford to Gloucester. The quarter-sessions are held alternately at Monmouth and at Usk. Poor-law Unions have been formed, and workhouses altered or erected at Abergavenny, Chepstow, Monmouth, Newport, and Pontypool. The principal gentlemen's residences are, Tredegar, Llanover, Troy, Pontypool Park, Piercefield, Llantilio Cressenny, Clytha, Llanwern, Coldbrook, and Llanvihangel Crucoory, a gloomy but beautiful place, having one broad avenue of old Scotch firs in front, and a second of very fine Spanish chesnuts at the back, with the Skyrrid, whence the prospect is magnificent, rising, as it were, out of the grounds.

History and Antiquities.—Monmouthshire at the time of the Roman invasion was occupied by the Silures, who made the then important town of Caerwent their capital. The Silures remained unmolested by the Romans until England was subdued, and successfully resisted their arms until the reign of Vespasian, when they were conquered by Julius Frontinus; from this time the Romans occupied their country, until A.D. 408, a period of 330 years. The history of this district during a period immediately subsequent to the departure of the Romans is uncertain and obscure; in the legends that exist, Monmouthshire is often a conspicuous scene, its sovereigns Uther Pendragon and Arthur [ARTHUR] are marvellously extolled, and Caerleon is mentioned as a place of great splendour and importance. During the establishment of the Heptarchy, the Saxons and the Welsh princes were continually in a state of warfare; the Saxons drove back their adversaries and confined them within the narrower limits which now form the boundaries of Wales and Monmouthshire, and compelled them to pay tribute. Wales was now divided into three principalities, Gwynedd, Powisland, and Deheubarth. Monmouthshire, once within the limits of Deheubarth, afterwards formed at some times a separate district under the name of Gwent, at others was comprehended in Morganwg, or the kingdom of Glamorgan. The petty princes who shared Monmouthshire were generally tributary to the kings of Glamorgan, but withheld their tribute whenever these kings were not in a condition to enforce the payment. Occasionally they aimed at independence: a savage attempt to obtain freedom is recorded to have taken place in 983. They were also bold enough to resist the English kings. Alfred, we find, made preparations to subdue Caerleon, and Canute entered Gwent in 1034, and defeated the prince of South Wales. It is a subject of dispute whether Monmouthshire was ever wholly conquered by the Saxons; but as they occupied Monmouth, Chepstow, and Caerleon, and Harold built a castle at Portscuitt, it may be conceived that, if the whole district was not actually in their power, it could not have failed to have been speedily overcome. The Normans, after their invasion of England, could spare no troops for the conquest of Wales; they therefore invited the barons to make incursions at their own expense, and rewarded them with the gift of the lands which they subdued. They held these lands by feudal tenure under the crown, built castles upon them for themselves and towns for their followers. The sites of about 25 castles have been traced in Monmouthshire alone. 'These lands,' says Enderlie, 'being holden, per baroniam, with full power to administer justice unto their tenants, were invested with divers privileges, franchises, and immunities, so that the writs of ordinary justices out of the king's courts were not current among them. But in case of strife between two barons' marchers, concerning their territories or confines, for want of a superior they had recourse to the king, their supreme lord, and justice was administered to them in the superior courts of the realm.' Such was the wretched state of feudal jurisprudence in Monmouthshire, as well as in the other marches of Wales, till Henry VIII., in the 27th year of his reign, abolished the government of the lords marches, divided Wales into twelve shires, and annexed Monmouthshire to England. Monmouthshire however was not wholly freed from the dominion of the Welsh until a later period of our history; it was not annexed to the Oxford circuit until the reign of Charles II., and remained partly under the authority of the lords marchers' court, which was not abolished until 1689.

The following are among the most important historical events which took place in the county of which we treat. Henry II. seized and garrisoned the town and castle of Caerleon, in his progress to Ireland, in 1171. In a subsequent year it was wrested from him by Jorwerth ap Owain. Henry III. made two expeditions against the castle of Grosmont, which had in earlier times belonged to the families of Breos and Cantilupe: having taken it, he conveyed it to Hubert de Burgh, but again seized it, and afterwards annexed it to the duchy of Lancaster. Owen Glendwr [GLENDWR] was defeated at Usk and at Grosmont in 1405. There is a tradition that this chieftain, after he was subdued, disguised himself as a shepherd, assumed the name of John of Kent, resided with his daughter, married into the antient family of Scudamore of Kentchurch, about a mile distant from Grosmont, that he died here, and was buried in Grosmont church. Usk Castle was frequently an object of attack, and the town and country surrounding it were many times laid waste. Chepstow Castle was considered an important fortress during the Rebellion: the king retained it till 1645; it was then taken and retaken; afterwards Cromwell marched against it in person, and compelled a surrender. Martin the regicide, after a confinement of twenty years, died here. He does not appear to have been rigorously treated. Raglan Castle, after a long resistance, was surrendered to Sir Thomas Fairfax, who besieged it in person in 1646.

The importance of the position of Monmouthshire has caused its occupiers at all early periods to fortify it to the best of their power. We find consequently many Roman encampments, and castles of different dates of architecture. The encampments, which are very numerous, have been laid down by Mr. Coxe on the map published with his history: they are dispersed pretty generally over the county, but are more frequent in the neighbourhood of Newport than in other parts. Two Roman roads traversed this county: the Via Julia, extending from the mouth of the Severn to Caerwent, Caerleon, and onwards to Neath; and Akeman Street, running eastwards from Caerwent over the rivers Wye and Severn to Cirencester. The stations which antiquaries have acknowledged to be Roman are, Isca Silurum (Caerleon), Venta Silurum (Caerwent), and Gobannium (Abergavenny). Horsley has fixed the stations Burrium and Blestium at Usk and Monmouth, but the correctness of his assertion cannot be ascertained. The following is an alphabetical list of the principal castles; in some instances great portion of the original building remains, in others demolition and decay have been extensive or complete:—Abergavenny, Caerleon, Caldecot, Castel Glâs, Chepstow, Dinham, Grosmont, Llanfair, Llangibby, Llanvaches, Llanvair, Monmouth, Newport, Pencoed, Penhow, Raglan, Skenfrith, Striguil, Usk, and White Castle.

Very antient dwelling-houses are seen at St. Pierre, Moin's Court, Pencoed, Machen, Werndee, and Treowen. St. Julians, now altered, was formerly the residence of Lord Herbert of Cherbury.

The principal ecclesiastical antiquities of this country are Tintern and Llanthony abbeys. The well-known ruins of Tintern Abbey are situated on the right bank of the Wye, about nine miles below Monmouth. The roof and tower of the building have fallen, but the greater part of the rest of the abbey remains in tolerable preservation. Its style is a transition from early English to Decorated; 'so that in beauty of composition' (says Mr. Rickman) 'and delicacy of execution, it yields to few edifices in the kingdom.' The abbey was founded in 1131 for Cistercian monks, by Walter de Clare, and dedicated to St. Mary. The building of the church was commenced by Roger de Bigod, earl of Norfolk; the abbots and monks first celebrated mass within it in 1268. The site was granted in the 28th of Henry VIII., to Henry, the second earl of Worcester, and the whole is now the property of the duke of Beaufort. Llanthony Abbey stands at the foot of the Black Mountain, in the Vale of Ewias, a portion of the northern promontory of the hundred of Abergavenny. The abbey, built like a cathedral, was in the shape of a Roman cross, and, though of small dimensions, was well proportioned. The building is of the twelfth century, an earlier date than that of Tintern, and in a style of transition from Norman to early English architecture. Through neglect only a small portion of the build-

ing remains; and unless increased care is taken of it, it will not be long before this portion falls to the ground. An account of the foundation and history of Llanthony, written in Latin by a monk of the abbey, may be found in Dugdale's 'Monasticon:' it is translated by Atkyns in the 'History of Gloucestershire.' The site was granted to Richard Arnold at the dissolution of monasteries, and by a purchase of Auditor Harley became a part of the possessions of the earl of Oxford.

In addition to Tintern and Llanthony, Tanner mentions the following religious houses (*Monmouthsh.*, in *Notit. Monas.*):—

Abergavenny .	A priory, which remained until the general suppression.
Bassaleg . .	A Benedictine priory.
Caerleon . .	A Cistercian abbot and monks.
Goldcliff . .	A priory, founded in 1113, and afterwards united to Tewkesbury. It was granted to Eton College in the 29th of Henry VI. The college was deprived of it, but subsequently regained possession.
Gracedieu . .	A small Cistercian abbey.
St. Kynemark or Kinmercy .	A priory, in existence before A.D. 1291.
Llankywan, or Llangwin .	Near Grosmont, a cell of Black Monks, subordinate to the abbey of Lira, in Normandy.
Llantarnam .	A Cistercian abbey.
Malpas . .	Near Caerleon, a cell of Cluniac Monks, to the priory of Montacute, in Somersetshire.
Monmouth . .	A priory of Black Monks, who came from Anjou in the reign of Henry I.; also two hospitals, one dedicated to St. John, the other to the Holy Trinity.
Newport . .	Situated 'by the key beneath the bridge' was a house, probably of Friars Preachers, for such was granted in the 35th of Henry VIII.
Strigil . .	An alien priory of Benedictines to the abbey of Corneille, in Normandy.
Usk . . .	An old hospital and a priory.

About two miles south of Chepstow may be seen the remains of Mathern, formerly the episcopal residence of the bishops of Llandaff. The palace, now converted into a farm-house, was built by different bishops in the fifteenth and sixteenth centuries. The last bishop who resided here died in 1706. Three druidical stones of considerable size are standing near the village of Trelleck, and several more may be seen in that vicinity.

(*Corporation and Boundary Reports;* Coxe's *Hist. of Monmouthsh.; Manufac. of Iron; Archæologia;* &c.)

The Welsh language still prevails in the hilly district bordering on Brecknock and Glamorganshire.

Statistics.

Population.—Monmouthshire is chiefly a mining county, and the extensive workings carried on for obtaining its valuable products of iron and coal have produced a remarkable increase of population in the south-west part of the county since the commencement of the present century. The parishes of Aberystwith, St. Woollos Newport, Mynyddystwyn, and Bedwelty, which contained less than 6000 inhabitants in 1801, were, in 1831, reckoned to contain 21,600; of these the male inhabitants are chiefly employed in the pits and mines, and in removing the coals and iron-ore. The process of forging the iron and otherwise preparing it for further purposes had, in 1831, created manufacturers to the number of 2000 at Trevethan and Pontypool; at Upper-Lanover 380, at Aberystwith 250, at Lanwenarth 84, at Monmouth 80, and 50 or 60 in other places. The preparation of tin employs 300 men at Panteague, Lower Lanvrechra, and Rogerstone. Iron-wire is manufactured at Chapel Hill by 60 men; the preparation of colours from lead and sugar of lead employs 76 men at Moryddmaen, and the manufacture of japanned tin is not quite extinct at Usk.

Of 26,910 males twenty years of age and upwards, 3293 are employed in the manufactures specified above; 7636 are engaged in agricultural pursuits, and 7173 are employed as labourers in labour not agricultural. In 1811 Monmouthshire ranked the nineteenth in the list of agricultural counties, but in 1831 it was as low down as the thirty-first in the list.

The following table exhibits a summary of the population, &c., of every hundred, as taken in 1831.

Hundreds, Cities, or Boroughs.	Houses.				Occupations.			Persons.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males, twenty years of age.
Abergavenny .	5,815	6,057	33	333	1091	3179	1787	16,500	14,318	30,818	8,849
Caldicot . .	2,222	2,393	13	98	955	1051	387	5,758	5,591	11,349	2,852
Ragland . .	1,575	1,652	14	101	903	399	350	4,095	3,842	7,937	2,046
Skenfreth . .	815	877	3	29	579	148	150	2,022	1,928	3,950	1,106
Usk . . .	1,864	2,004	20	167	822	640	542	4,907	4,777	9,684	2,588
Wentlloog . .	5,427	5,764	72	230	1126	2594	2044	15,477	13,999	29,476	8,193
Monmouth . .	894	1,164	15	29	138	615	411	2,336	2,580	4,916	1,276
Totals . .	18,612	19,911	170	987	5614	8626	5671	51,095	47,035	98,130	26,910

The population of Monmouthshire, at each of the four following periods, was:—

	Males.	Females.	Total.	Inc. per cent.
1801	22,173	23,409	45,582	..
1811	30,987	31,140	62,127	36·29
1821	37,278	35,555	71,833	15·62
1831	51,095	47,035	98,130	36·60

showing an increase between the first and last periods of 52,548, or more than 115 per cent. on the whole population, being 58 per cent. beyond the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the four dates of—

		£.		s.	d.	
1801	were	18,283,	being	8	0	for each inhabitant.
1811	..	28,247	„	9	1	„
1821	..	26,040	„	7	3	„
1831	..	26,613	„	5	5	„

The sum expended for the same purpose for the year ending March, 1838, was 18,302*l.*; and assuming that the population had increased from 1831 to 1838 in the same rate of progression as in the ten years preceding 1831, the above sum gives an average of 3*s.* for each inhabitant. These averages are below those for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending 25th March,

1833, was 37,824*l.* 4*s.*, and was levied upon the various descriptions of property as follows:—

On land	£27,806	4*s.*
Dwelling-houses	6,998	3
Mills, factories, &c.	1,030	2
Manorial profits, navigation, &c.	1,989	15
Total	£37,824	4

The amount expended was—

For the relief of the poor	£28,958	19*s.*
In suits of law, removal of paupers, &c.	1,868	12
For other purposes	7,203	10
Total money expended	£38,031	1

In the returns made up for subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 37,706*l.* 13*s.*, 32,669*l.* 5*s.*, 31,191*l.* 14*s.* (not specified in 1837), and 28,711*l.* respectively: and the expenditure of each year was as follows:—

	1834. £.	1835. £.	1836. £.	s.	1837. £	1839. £
For the relief of the poor	27,626	23,805	22,376	16	19,487	18,302
In suits of law, removal of paupers, &c.	2,557	1,325	1,020	15	896	469
Payments towards the county-rate	7,219	5,551	5,984	14	not given.	7,129
For all other purposes		2,856	2,471	11	1,375	1,949
Total money expended	£37,402	33,537	31,853	16		27,847

The saving effected in the sum expended in 1838, as compared with that expended in 1834, was therefore 9555*l.* 15*s.*, or about 25¼ per cent.; and the sum expended for the relief of the poor in 1838 was less than that in 1834 by 9324*l.*, or about 33¾ per cent.

The number of turnpike trusts in Monmouthshire, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 11; the number of miles of road under their charge was 315. The annual income arising from tolls and parish compositions in lieu of statute-duty in 1835 was 31,962*l.* 7*s.*, and the annual expenditure in the same year was as follows:—

	£.	s.	d.
Manual labour	3,113	15	0
Team labour and carriage of materials	760	16	0
Materials for surface repairs	1,330	7	0
Land purchased	157	0	0
Damages done in obtaining materials	69	8	0
Tradesmen's bills	885	2	0
Salaries of treasurer, clerk, and surveyor	1,094	3	0
Law charges	341	15	0
Interest of debt	3,363	3	0
Improvements	2,908	11	0
Debt paid off	685	16	0
Incidental expenses	262	17	0
Estimated value of statute duty performed	599	10	0
Total expenditure	£16,572	3	0

The county expenditure in 1834, exclusive of that for the relief of the poor, was 4940*l.* 17*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building, repairs, &c.	263	14	0
Gaols, houses of correction, &c., and maintaining prisoners, &c	1,794	10	0
Shire-halls and courts of justice, building, repairing, &c.	66	16	0
Prosecutions	1,129	19	0
Clerk of the peace	319	17	0
Conveyance of prisoners before trial	211	14	0
„ of transports	118	15	0
Vagrants, apprehending and conveying	49	18	0
Constables, high and special	44	19	0
Coroner	147	8	0
Debt, payment of, principal and interest	475	0	0
Miscellaneous	318	7	0
Total expenditure	£4,940	17	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 282, 412, and 741 respectively, making an average of 40 annually in the first period, of 59 in the second period, and of 106 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 60, 53, and 48 respectively. Among the persons charged with offences there were committed for—

	1831.	1832.	1833.
Felonies	51	48	43
Misdemeanors	9	5	5

The total number of committals in each of the same years was 64, 56, and 52 respectively.

	1831.	1832.	1833.
The number convicted was	42	37	28
Acquitted	29	10	15
Discharged by proclamation	12	8	3

There were 197 persons charged in 1837 with crimes at the assizes and sessions in Monmouthshire. Of these 10 were charged with offences against the person, 4 of which were common assaults; 24 were charged with offences against property committed with violence; 145 with offences against property committed without violence; not any were charged with malicious offences; 8 for forgery and uttering counterfeit coin; 7 for riot, and 3 for keeping disorderly houses. Of the whole number committed 131 were convicted, 37 were acquitted, 3 were not prosecuted, and no bill was found against 26. Of those convicted 5 were transported for life, 5 for fifteen, 7 for ten, and 6 for seven years; 1 was imprisoned for three years, 5 were imprisoned for two years or above one year, 22 for one year or above six months, and 77 for six months or under; 3 were fined. Of the whole number of offenders 156 were males, and 41 females; 57 could neither read nor write, 116 could read and write imperfectly, 10 could read and write well, not any had been instructed beyond reading and writing, and the degree of instruction of the remaining 5 could not be ascertained.

The number of persons registered in 1837 to vote for county members was 4347. Of these 2466 were freeholders, 418 leaseholders, 339 copyholders, 1100 occupying tenants, 13 trustees, 11 mortgagees: being one in 23 of the whole population, and one in 6 of the male population twenty years and upwards, as taken in 1831. There was no contest at the last general election for the representation of this county.

Monmouthshire contains 5 savings' banks: the number of depositors and amount of deposits on the 20th November, in each of the following years, were as under:—

	1832.	1833.	1834.	1835.
Number of depositors	1,534	1,435	1,896	1,964
Amount of deposits	£39,894	£36,910	£47,166	£49,221

The various sums placed in the savings' banks in 1836, 1837, and 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	1,169	£8,069	1,258	£8,663	1,396	£9,468
„ 50	657	19 408	708	20,751	759	22,746
„ 100	224	15 349	242	16,321	255	17 249
„ 150	55	6,653	65	7,692	73	8,784
„ 200	17	2,805	20	3,294	20	3,486
Above „ 200	3	748	2	563	2	582
	2,125	53,032	2,295	57,284	2,505	62,315

Education.—The following summary is taken from the Parliamentary Returns on Education made in the session of 1835.

	Schools.	Scholars.	Total.
Infant schools	9		
Number of children at such schools; ages from 2 to 7 years:—			
Males		64	
Females		78	
Sex not specified		46	
			168
Daily schools	196		
Number of children at such schools; ages from 4 to 14 years:—			
Males		2,689	
Females		2,277	
Sex not specified		1,511	
			6,477
Schools	205		
Total of children under daily instruction			6,645
Sunday-schools	160		

Number of children at such schools; ages from 4 to 16 years:—

Males	. .	5,157
Females	. .	4,881
Sex not specified	.	2,507
		12,545

Assuming that the population between the ages of 2 and 15 years has increased in the same proportion as the whole of the population since 1821, and that the whole population has increased in the same ratio since 1831 as in the ten years preceding that time, the approximate number of children between the ages of 2 and 15 thus found residing in Monmouthshire in 1833 was about 35,000. Seventeen Sunday-schools are returned from places where no other school exists, and the children (685 in number) who are instructed therein cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Eleven schools, containing 547 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created; at several of the Sunday-schools a few are receiving instruction who are upwards of 20 years of age. Making allowance for these two causes therefore, we may perhaps fairly estimate that little more than one-third of the children between the ages of 2 and 15 years are under instruction in this county.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription.		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls.	Scholars.	Schls.	Scholars	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	—	—	2	104	7	64	-	—
Daily Schools	17	793	10	643	146	3,573	23	1,468
Sunday Schools	2	222	151	12,029	1	17	6	277
Total....	19	1,015	163	12.776	154	3,654	29	1,745

The schools established by Dissenters, included in the above statement, are—

				Scholars.
Infant schools	. .	—		—
Daily schools	. .	6	containing	136
Sunday-schools	. .	91	.	9,396

The schools established since 1818 are—

				Scholars.
Infant and other daily schools		114	containing	3,305
Sunday-schools	. .	146	.	12,122

Sixteen boarding-schools are included in the number of daily schools given above. No school in this county appears to be confined to the children of parents of the Established Church, or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by Dissenters, with whom are here included Wesleyan Methodists.

Lending libraries of books are attached to 8 schools in this county.

MONO'CEROS. [ENTOMOSTOMATA, vol. ix., p. 458.]

MONO'CEROS (the Unicorn), a constellation of Hevelius, surrounded by Hydra, Canis Major, Orion, and Canis Minor. Its principal stars are as follows:—

Character.	No. in Catalogue of Flamsteed. (Piazzi.)	No. in Catalogue of Astron. Society.	Magnitude.	Character.	No. in Catalogue of Flamsteed. (Piazzi.)	No. in Catalogue of Astron. Society.	Magnitude.
A[2]	2	744	6	*i*	17	839	5
	3	751	6	*k*	18	840	5
D[2]	4	765	6	*s*	19	873	5
a	5	781	4½		20	884	6
	7	788	6	*m*	22	887	4½
b	8	794	4		25	938	6
	10	806	6	*n*	26	944	6
e	12	812	6½	*p*	28	983	5
f	13	813	5		29	994	6
g	14	819	5½	*q*	30	1027	6
h	15	827	5½		(82)	793	6
	16	837	6		(95)	1041	6

MONOCHORD (μόνος, *one*, and χορδή, a *string*), an instrument of one string, used by really scientific musicians, for the purpose of ascertaining and demonstrating the relative proportions of musical sounds. It is composed of a board, or rule, divided and subdivided into various parts, and of a string distended between two bridges, one of which is placed at each end of the rule. There should also be a moveable bridge applicable to the graduated line, in order to stop the string at the distances required, leaving both hands of the operator at liberty; but this is not indispensable. The invention of the Monochord is attributed to Pythagoras, and Ptolemy measured and proved all his intervals by it. Guido also, in his *Micrologus*, strongly recommends the use of this instrument, and gives ample directions for its division, according to his system, for a translation of which we refer the reader to Hawkins's *History*, i. 449. In Dr. Crotch's *Elements of Musical Composition* will be found a simple and cheap method of constructing a Monochord, with plain rules for dividing it for common practical purposes.

MONOCONDYLÆA, M. D'Orbigny's name for a subgenus of *Unionidæ*, which he describes as equivalve, inequilateral, sub-rotund or angulated with a hinge formed of a large, obtuse, round, cardinal tooth in each valve, but without lateral teeth. Example, *Monocondylæa Paraguayana*, D'Orbigny.

MONOCOTYLE'DONS are those plants which are now more commonly called Endogens. [ENDOGENS.] They derive their name from their seed having generally only one cotyledon; but there are exceptions to this, as in wheat, which possesses a second cotyledon in a rudimentary state. Usually the single cotyledon of these plants rolls up, enclosing the radicle and plumula, so that the embryo appears to be a cylinder with no interruption to the continuity of its surface; but there are many deviations from this, the most striking of which are those of grasses and aquatic Monocotyledons.

MONO'CULUS. [BINOCULUS, vol. iv., p. 410.] N.B. The figure is erroneously placed upside down.

MO'NODON, the Linnean name for the *Narwhal*.

MONODONTA (or rather MONODON), Lamarck's name for a genus of *Trochidæ*, the columella of which terminates abruptly in a tooth or notch. It is the *Odontis* of Sowerby. [TROCHIDÆ.]

MONOGRAM, a cipher or character formed by an interlacing of letters, intended as an abbreviation of a name, formerly much used. Monograms are of very antient date. They are not uncommon upon Greek coins, especially those of Macedonia and Sicily. They likewise occur upon the coins of the Seleucidæ, and are found upon many of the family coins of Rome, though not upon those of the Roman emperors till a late period.

The monogram of Jesus Christ, ☧, upon the coins of Constantine the Great, is well known. It was continued frequently by his successors, even as low down as Alexander Comnenus and Theodorus Lascaris, and was also placed at one period upon the Roman labarum.

Montfaucon, in his 'Palæographia Græca,' p. 144, has given a small plate of monograms used on coins, and, in antient manuscripts, to represent the names of Greek cities. Such will also be found in Schlæger, 'Comment. de Numo Alex. M.,' tab. 3; and in Froelich, 'Annal. Reg. Syr.,' tab. 20. Dr. Charles Combe, in the 'Museum Hunterianum,' 4to., Lond., 1782, plates 63 and 64, has given no less than four hundred and twenty monograms which occur upon the coins of Greek states and cities: others will be found in tabb. xiv., xv. of the 'Veterum Populorum et Regum Numi qui in Museo Britannico asservantur,' 4to., London, 1814.

The conjunction of two, three, or four letters together is not uncommon in Greek and Roman inscriptions. Many of those of the Roman time will be found in Gorrard's 'Siglarium Romanum,' 4to., Lond., 1792. Père Menestrier has preserved those of many of the popes. Ducange, in his 'Glossary,' has given tables of those of the popes, emperors, and kings of France. Monograms appear upon almost all the coins of the kings of France of the second race, that is, from A.D. 751 to 987. (Le Blanc, *Traité Historique des Monnoyes de France*, pp. 87-144.) Eginhard gives as a reason for Charlemagne's using a monogram upon his coins, that he could not write; and Le Blanc adds that a great many bishops did the same for the same reason, which is absurd, as at that period it was the fashion of

Europe generally. They appear upon our own Saxon coins, and especially upon those of Alfred.

Bartsch, in his 'Le Peintre Graveur,' has given tables of the monograms used by the German and Italian engravers. The French artists rarely used monograms. The most extensive information however on this class of monograms will be found in the best edition of Brulliot's 'Dictionnaire des Monogrammes, Marques figurées, Lettres initiales, Noms abrégés, &c., avec lesquels les Peintres, Dessinateurs, Graveurs, et Sculpteurs ont désigné leurs Noms,' 2 tom. 4to., Munich, 1832.

MONOI'CA, M. de Blainville's name for his second subclass of the class *Paracephalophora*. [MALACOLOGY, vol. xiv., p. 323.]

MONO'LEPIS, a genus of macrurous crustaceans intermediate between *Porcellana* and *Megalopa*, established by M. Say.

MONOMA'NIA. [INSANITY.]

MONOMYA'RIA, Lamarck's name for his second order of *Conchifera*, consisting of those conchifers which have but one principal muscular impression in each valve of the shell. [CONCHIFERA, vol. vii., pp. 431, 433; MALACOLOGY, vol. xiv., p. 319.]

MONONGAHELA. [MISSISSIPPI, River.]

MONO'PHORUS. [SALPIDÆ.]

MONOPHYLLUS. [CHEIROPTERA, vol. vii., p. 23.]

MONOPHYSITES. [EUTYCHIANS.]

MONOPLEUROBRANCHIA'TA, M. de Blainville's name for his third order of *Paracephalophora Monoica*. [MALACOLOGY, vol. xiv., p. 323.]

MONO'POLY, from the Greek *monopôlia* (μονοπωλία), which occurs in Aristotle's *Politick* (i. 11), where it is used simply in the sense of a man buying up the whole of a commodity so as to be the sole holder of it, and to have the power of selling it at his own price. When the word monopolium was used by Tiberius in addressing the Roman senate (Suet., *Tib.*, c. 71), he thought an apology necessary for introducing a new word. The word however soon came into common use. The term monopoly, which literally signifies *single* or *sole selling*, is used in a constitution of Zeno (*Cod.*, iv. 59) in the sense in which it is used by Aristotle, and in the sense of what our law understands by forestalling, engrossing, regrating; to which we may add combining to keep up prices. Zeno declares that no person shall exercise a monopoly of clothing, fish, or any other thing adapted for food or use. He gives no definition of monopoly. The term however must be explained from the context, from which it appears to signify any means by which a person gets or attempts to get the whole of any commodity into his possession for the purpose of enhancing the price. In the same Constitution he forbids all combination among dealers to raise the prices of any commodity. Zeno's punishment for monopoly was confiscation of the goods of the offender and perpetual exile.

A monopoly, according to the English law, is defined by Coke (3 *Inst.*, 181, c. 85, 'against monopolists,' &c.) to be 'an institution or allowance by the king, by his grant, commission, or otherwise, to any person or persons, bodies politic or corporate, of or for the sole buying, selling, making, working or using of any thing, whereby any person or persons, bodies politic or corporate, are sought to be restrained of any freedom or liberty that they had before, or hindered in their lawful trade.' In *Le Case de Monopolies* (11 *Co.*, 86, *b*) it is said that every monopoly has three inseparable incidents—the raising of the price, the deterioration of the commodity, and the impoverishment of artificers and others. It appears that these inseparable incidents were considered as tests by which a grant savouring of monopoly might be tried.

Every royal grant or letters patent tending to a monopoly as thus defined and explained, was void. The crown however could by letters patent grant and create exclusive privileges of buying and selling when such grant was of general use, or when the grant was to an individual who had introduced into the country something new and useful. This prerogative of the crown was often abused, and by none more than by Elizabeth, who granted many patents of monopolies for the purpose of raising money. As an instance of this, Elizabeth had granted to a certain person the sole making, importing, and selling of playing cards, which grant was declared void by the judges. (*Le Case de Monopolies.*)

It seems then that the word monopoly was never used in English law, except when there was a royal grant authorising some one or more persons only to deal in or sell a certain commodity or article.

By the act of 21 Jac. I., c. 3, all monopolies and all commissions, grants, licences, charters, and letters patent to any person or body politic or corporate, of or for the sole buying, selling, making, working, or using of any thing, or of any other monopolies, &c., are declared contrary to the laws of the realm and utterly void and of none effect.

By the sixth section of the same statute the above provisions do not extend to letters patent and grants of privilege thereafter to be granted for fourteen years or under, of the sole working or making of any new manufacture, to the true and first inventor thereof, which others at the time of making such letters patent and grants shall not use, so as also such letters patent be not contrary to the law or mischievous to the state, or generally inconvenient. This section is the foundation of the present law as to patents for inventions. [PATENTS.]

Copyright and patents are now generally placed among monopolies by legal writers, but not correctly. The original legal sense of the term monopoly has been already explained; and the power of the crown to grant patents is now limited and defined, as well as the several formalities to be observed in obtaining them. Any patent not obtained in due form is void; and the term monopoly, as above explained, has legally ceased to exist.

There is still a vulgar and common use of the term monopoly, which is incorrect, inasmuch as it has not the sense which monopoly had.

If a number of individuals were to unite for the purpose of producing any particular article or commodity, and if they should succeed in selling such article very extensively, and almost solely, such individuals in popular language would be said to have a monopoly. Now, as these individuals have no advantages given them by the law over other persons, it is clear they can only sell more of their commodity than other persons by producing the commodity cheaper and better. Such so-called monopoly then is neither the old legal monopoly, nor does it rest on any legal privilege. There would however be no objection to calling it a monopoly in the antient sense of that term, if the word were not now used in a bad or unfavourable sense, which probably dates from the time when real monopolies were granted by the crown, and were very injurious to the nation. Between a monopoly as it once existed, and a monopoly as it is now vulgarly understood, there is this difference—the former was only derived from a grant of the crown, and was often injurious to all persons except the patentee; that which is now vulgarly called a monopoly is nothing more than the power which an individual or a set of individuals acquire, by means of capital and skill, of offering something to everybody cheaper and better than they had it before, and it is therefore an advantage both to the so-called monopolists and to everybody else.

The case of a number of persons combining to produce and sell, or to buy and sell, a thing, has been taken, as being one which is the most striking and oppressive kind of monopoly, in the vulgar sense of that term. An individual however may, in this sense, become a monopolist: as if a man should buy up all the tallow in Russia, and so make candles as dear as he pleased; or (to take a case which would appear a still greater act of monopoly, as being more sensibly felt) as if a man should buy all the corn in a country, and so make bread as dear as he pleased. Without discussing the question as to the advantages and disadvantages to a nation of this kind of monopoly, it is enough to put it upon those who disapprove of such wholesale buying, to say how far, and to what amount, they will allow a man to use his capital and exercise his commercial skill; for it is incumbent on those who would deprive a man of such liberty to say exactly how far such liberty should go.* Further, if such persons wish to be exact in their language, they should use another word than monopoly, which had once a particular meaning, as above explained, and signified a different thing from that which they call a monopoly. And if they will apply this word monopoly to a person or persons who, by industry and skill, and the judicious employment of capital, make and sell or buy and sell much more of a thing than anybody else, they should consider whether—inasmuch as buying and selling are free to all, and as all people wish

* At Athens there was a law which limited the amount of corn that a man could buy. (Lysias, κατὰ τῶν σιτοπωλῶν.)

to buy as cheap as they can and as good as they can—they will apply this word in an invidious sense to any person or persons who can only command customers because the customers like to go to them, or because the customers can get the thing nowhere else, owing to no other persons having provided themselves with the commodity for sale.

That kind of monopoly or sole-selling or dealing which is given by the law of copyright, and by patents, is in effect a kind of property created by law for the benefit of an author or inventor, and which he could not effectually acquire or secure without the aid of the law. It is not however a monopoly in any sense in which that term has ever been used. Whether it is profitable or injurious to the community is a question that concerns legislation.

MONOSYLLABLE. [SYLLABLE.]

MONOTHALA'MIA, Lamarck's name for his second division of *Cephalopoda*, including one genus only, viz. *Argonauta*. [CEPHALOPODA, vol. vi., p. 426; MALACOLOGY, vol. xiv., p. 321.]

MONOTHELITES. [EUTYCHIANS.]

MONOTIGMA, Mr. Gray's name for a genus of turbinated shells allied to *Turritella*.

MONOTREMES, M. Geoffroy's name for certain edentate mammals which have but one external aperture for the passage of the semen, the urine, and the other excrements.

The organs of generation of these extraordinary animals present, as might be anticipated, singular anomalies. The different canals terminate in the urethra, which last opens into the cloaca. Their intromittent male organ lies hid, when in repose, in a sheath which opens by means of a hole towards the bottom of the cloaca. Their uterus merely consists of two canals which open separately, and each of them by a double orifice into the urethra, which is large, and, as in the male, has its exit in the cloaca. It was for a long time doubted whether these animals were oviparous or viviparous, but there is now every reason for believing that the young are excluded from the body of the parent alive. Though they have no pouch, they still possess the supernumerary bones which exist in the *Marsupialia*, and are described in the article which treats of the last-named animals. In other parts of their osseous structure they are remarkable for possessing a sort of clavicle, placed more forward than the ordinary clavicle, and analogous to the *os furcatorius*, furciform bone, or merry-thought in birds: the coracoid bone also reaches the sternum. The eyes are very small, and there is no external concha to the ear. Two genera only are known, *Echidna* and *Ornithorhynchus*. [ECHIDNA; ORNITHORHYNCHUS.]

MONOTROPA'CEÆ are a small natural order of monopetalous exogenous plants, parasitical upon the roots of other species, and covered with brown scales instead of leaves. They resemble Orobanchaceæ, from which they differ in their regular flowers and multilocular ovary. In natural classifications they are usually placed in the neighbourhood of Ericaceæ, on account of their flowers being monopetalous with hypogynous stamens. Monotropa hypopithys, found in fir woods, is the only European species.

MONRO, ALEXANDER, M.D., was born in 1697. He was a pupil of Cheselden, and afterwards studied at Paris, and under Boerhaave at Leyden. In 1718 he returned to Edinburgh, where his father practised as a surgeon, and in the following year was appointed Professor of Anatomy to the Company of Surgeons. He soon after, in conjunction with Dr. Alston, commenced giving public lectures on anatomy, and thus laid the foundation of a school of medicine in Edinburgh, which was soon after attached to the university. It was also at the suggestion and under the direction of Dr. Monro that the Royal Infirmary of Edinburgh was established, in which he delivered clinical lectures on surgery, Dr. Rutherford at the same time lecturing on medicine. In 1759 he resigned the lectureship on anatomy to his son, from whom it has since descended to his grandson; but he retained his clinical lectureship till within a short period of his death in 1767. He was a fellow of the Royal Society of London, and a member of the Royal Academy of Surgery in Paris; and it is chiefly to his talents as a lecturer that the Medical School of Edinburgh first owed the celebrity which it has since always enjoyed.

The greater part of Dr. Monro's writings are contained in the Transactions of different scientific societies, especially in those published by a Society of which he was the founder, under the titles of 'Medical Essays and Observations,' and 'Essays Physical and Literary.' The work by which he is chiefly known is his 'Osteology,' which was first published in 1726, and which has been since reprinted in a great variety of forms, and with various additions, both in this country and on the Continent. His complete works were published by his son, in one volume 4to., in 1781.

MONROE, JAMES, was born in the county of Westmoreland, Virginia, on the 16th of March, 1751, of a Scotch family. Nothing is known of his early life; but he seems to have soon shown great decision of character, having entered the army as a volunteer at the age of sixteen. In 1777, in the retreat through the Jerseys, he was wounded at Trenton. He was then a lieutenant, and on his recovery was made an aid to Lord Stirling with the rank of major. Just before the close of the war, he was appointed colonel on the recommendation of General Washington. He then went to the college of William and Mary in Virginia, where he studied law; and soon after represented his native county in the legislature; and was also appointed to the council of state. In 1788 he was a member of the Virginia Convention, and was opposed to the adoption of the constitution. After it came into operation, he became a candidate for a seat in the house of representatives, in opposition to Mr. Madison, and lost his election. He was however soon after chosen a senator of the United States by the state of Virginia, and after continuing in that body about three years, he was appointed by General Washington minister to France in the place of Mr. Gouverneur Morris, who had become unacceptable to the ruling party in that country. It was thought that a well known member of the party friendly to the French revolution might be able to restore that confidence between the two countries which was already diminished by the supposed leaning of Hamilton and his party towards Great Britain.

He accordingly endeavoured to fulfil this object of his mission, and, as some thought, at too great sacrifice of the rights and interests of his own country. Such was the opinion of the administration, especially after the avowed change of policy by France in consequence of Mr. Jay's treaty, and he was accordingly recalled in August, 1796. It was considered by the Opposition, French, or Democratic party, for it was called by all these names, that he had been sacrificed for his attachment to liberal principles, and as the majority in Virginia belonged to this party, he was appointed governor of that state in 1798-9. He held the office for three years. In 1802 he was appointed minister to France, and, in conjunction with Mr. R. R. Livingston, who was already in Paris and engaged in negotiating the purchase of New Orleans, he succeeded in effecting the purchase of Louisiana. From France he went to Spain, and thence to Great Britain, as minister, where, with his adjunct Mr. Pinckney, he concluded a treaty in 1807, which Mr. Jefferson, disapproving, refused to lay before the senate. Mr. Monroe returned home in 1808, much dissatisfied that the treaty, which had been with great difficulty effected, had been received with so little respect, and that his return had been delayed, as he supposed, for the purpose of preventing his competition with Mr. Madison for the presidency. He was accordingly supported by the opposition in Virginia, and great efforts were made to enlist the popular sympathies in his favour; but all these efforts failed, and he obtained no votes in his own state or elsewhere. By means of Mr. Jefferson a reconciliation was brought about, and Mr. Monroe was then made secretary of state, in which office he continued until he was chosen president, in 1816, by 128 votes against 34. So prudent and conciliatory had been his conduct, and so little had the course of public affairs interfered with his popularity, that he was elected unanimously, with the exception of a single vote. After his term of office expired, he lived a short time in Loudon county, in Virginia, where he accepted the office of justice of the peace. He was also a visitor of the university of Virginia. Towards the close of his life he removed to New York, where he died on the 4th of July, 1831. He left two daughters, Mrs. Hay and Mrs. Gouverneur, who resided in New York, in which he had married while member of Congress in 1790.

Mr. Monroe was not endowed with any shining qualities, but he had great prudence, united to great firmness, great regard to reputation, sound though slow judgment, and unwearied perseverance. He never could have attained the dignity of the presidency independent of his intimacy and political connection with Mr. Jefferson; but it is no

small praise to have profited as he did by these favourable circumstances, and there has seldom been so striking an example of what steadiness of purpose and untiring perseverance can accomplish. His manners were mild and amiable, but, considering the society he had always kept, he was strangely awkward in almost all that he said and did: he used odd inappropriate expressions, and often said what might have been better omitted. But all this was only in minor matters; he generally acted wisely and sagaciously. He had unusual success in making friends, and though his kindness and courtesy would in most people have appeared insincere, it always seemed to come from the heart with him, and without doubt he really possessed much of the benevolence which he appeared to feel. He was even a worse manager of money matters than Mr. Jefferson. He was always in debt, and always in want of money; but by the grants which he obtained from Congress, and an inheritance derived from an uncle, he left to his daughters a competent fortune. (*Communication from Virginia.*)

MONRO'VIA. [MASSURADA, CAPE.]

MONS, the capital of the province of Hainault, is situated in 50° 27′ N. lat. and 3° 59′ E. long., on the river Trouille, by which the city is divided into unequal parts. It is one of the strongest fortified towns in Belgium, the works having been greatly improved since 1818: its form is that of a polygon flanked with fourteen bastions. It is supposed that Mons occupies the site of the Roman station which was so bravely defended by Quintus Cicero, brother of the orator, against the attacks of the Eburones, Nervii, and other Gallic tribes. Having fallen to ruin, it was fortified anew about the year 456, in the wars of Merovæus, but was abandoned in 473, and, with the country about it, was uninhabited for nearly two centuries. About the year 653 a hermitage, and then a chapel, dedicated to St. Peter, were built on the spot; and some time after, Alberic, count of Hainault, having rebuilt one of the towers, and surrounded it with a wall, made it his place of residence, a circumstance which attracted many other inhabitants. The town from this time went on increasing, and in 804 Charlemagne made it the capital of Hainault. Towards the end of the tenth century Mons sustained a siege against Hugh Capet, and about fifty years later was again invested by Baldwin of Flanders. In 1093, and again in 1112, great part of the city was destroyed by fire; and towards the middle of the twelfth century it suffered greatly from the plague. Count Baldwin IV., who then reigned, did much to repair these disasters, and thus gained the well-merited title of the Restorer. Under his successor Baldwin V., the citizens, having repulsed the count of Brabant, obtained various privileges, among which was that of arming and organising themselves for the defence of the city. In 1290 the city was enlarged, and new walls, enclosing a greater area, were built. In the war which Jacqueline of Bavaria, countess of Hainault, sustained with the duke of Burgundy, Mons, after an obstinate resistance, fell into his hands in 1436. From that time till the middle of the sixteenth century the history of the city offers little worthy of remark, except the appearance at various periods of the plague, which committed great ravages. Under the reign of Charles V. Mons attained the highest degree of prosperity; and such was the extent of the woollen manufacture carried on, that at the hour when the workmen left their labour the streets were too narrow for the traffic, and the passing of carriages through them was forbidden. Manufactures of hardware were also pursued, and there were several streets wholly inhabited by goldsmiths. This state of prosperity was cut short by the exactions of the duke of Alva in 1569, which caused the inhabitants to revolt, and they for some time maintained themselves under Count Lewis of Nassau; but one of the gates of the city having been treacherously given up to the duke of Alva, the count capitulated, against the wish of the people, who declared their readiness to fight to the last extremity, and to perish in the ruins of the city rather than surrender. According to the terms of the capitulation, the garrison, and such of the inhabitants as desired it, were allowed to retire from the city. Of those who remained a great part were executed at the stake or on the scaffold. Mons was quiet under the rule of the archdukes of Austria, but its commerce and its splendor passed away with the manufacturers, and the loss of its workmen and artists. In 1678 Mons was invested by the French under marshal Luxemburg, but the siege was raised in consequence of the treaty of Nimeguen. In 1691 the city was again assailed by Lewis XIV., and was defended with the greatest bravery until the walls were altogether destroyed, and nearly all the houses were in ruins. In this memorable siege there were discharged against the ramparts 57,673 balls; 5750 shells were thrown into the town; sometimes, in a single night, as many as 1000 red-hot shot were discharged, and the besiegers expended throughout the attack 597,800 pounds of gunpowder. Mons remained in possession of the French until the peace of Ryswick. They occupied it again in 1701, and were besieged in 1709 by Prince Eugene and the duke of Marlborough, to whom the town capitulated twenty-four days after the opening of the trenches. By the treaty of Utrecht, Mons was restored to Austria: it was taken again by the French in 1746, and reverted to Austria once more in 1748. It was taken by the French under Dumourier in 1792. In 1794 it was declared part of France, and was the capital of the department of Jemappe until 1814.

Mons is entered by five gates. It contains 76 streets, besides a great number of lanes. The former are for the most part wide, clean, and well paved. There are 3684 houses, with a population of 23,231.

The church of St. Wandru, which is built on the site of the hermitage already mentioned, is a remarkable specimen of Gothic architecture, and one of the finest ornaments of the city. The present building, the first stone of which was laid in 1460, was preceded by several which were successively destroyed by fire. The church as it now stands was built by degrees and at long intervals, so that it was not finished until 1589. It is in truth still incomplete; the tower, which, according to the plan, should have surmounted the portal, has not been erected for want of sufficient funds. There are several other churches in Mons, but only one—that dedicated to St. Elizabeth—which is at all remarkable: it is surmounted by a rich cupola. The other buildings of note in the city are:—the town-hall, built in 1440; the tower of the castle, built in 1662; the Palace of Justice; the college; the military hospital; the arsenal; and the theatre, which will hold a thousand persons.

Among the manufactories of Mons are sugar and salt refineries, soap and starch works, oil-crushing-mills, saw-mills, and flour-mills. Woollen and cotton manufactures, cutlery, pins, gloves, and various minor articles are also made there. It is the residence of many rich proprietors, and is the centre of a very active trade in coals, flax, hemp, grain of various kinds, mill-stones, horses, and cattle.

Mons contains a tribunal of *première instance*, and of commerce, and is the residence of the governor of the province and the provincial commandant.

The Mons and Condé canal, which connects those two places, is supplied with water from the river Haine, which passes close by the town. It runs in a westerly direction, and enters France in the arrondissement of Valenciennes, in the department du Nord. It has seven locks, five of which are in Hainault and two in France. Its construction was begun by the French in 1807, and finished in 1814. The number of boats that passed through this canal in 1816 was 3287; and in each year since the number appears to have gone on increasing. In 1828 there were 6009 boats, of which 3603 were loaded with coal for consumption in France.

(*Dictionnaire Géographique de la Province de Hainault*, par Dr. Meisser; *Annuaire de l'Observatoire de Bruxelles*.)

MONSOON (in French *mousson*), is a term applied to the periodical winds of the Indian Ocean, and, according to Marsden, is a corruption of the word *mooseem*, which, both in Arabic and Malay, signifies a year. These winds have from the earliest times attracted the attention of the navigator, as, by taking advantage of their regular blowing, an easy and speedy voyage may be calculated upon with certainty; whilst, by opposing their force, the voyage is rendered laborious, slow, and uncertain.

The Indian Ocean is open towards the south, and no considerable island occurs between the meridian of Madagascar and that of the western shores of Australia, as far south as the sea has been navigated (70° S.); on the west is Africa, on the north Arabia, Beloochistan, and Hindustan, and on the east India without the Ganges, the Indian Archipelago, and Australia. The monsoons however prevail also in the seas between Australia and China; and those seas are considered as a portion of the Indian Ocean.

The southern part of the Indian Ocean, or that which lies between the western coast of Australia and the island of Madagascar, has the regular south-east trade-wind, which extends southward to between 28° and 30° S. lat., but its northern border varies between 12° and 3° S. lat., approaching nearer to the equator when the sun is in the northern hemisphere. Cook found it, in February, between 10° and 12°; Basil Hall, in June, near 7°; Nicholson, in August, at 3½°; and Carteret, in October, at some distance south of Java.

The monsoons do not begin immediately north of the northern border of the trade-wind, but are separated from it by a region which corresponds with the region of calms in the Atlantic. [ATLANTIC OCEAN, vol. iii., p. 26.] Though calms occur in this region of the Indian Ocean also, they are not regular, and are frequently interrupted by winds, which, when the sun is in the northern hemisphere, generally blow between south-west and north-west, and, in the other six months, between south-east and north-east. They are usually called the north-west and north-east monsoons, but not with propriety, as they do not coincide with the proper monsoons in time, nor do they seem to be connected with them in any way.

The region of the proper monsoons lies to the north of this region, and they blow with the greatest force and with most regularity between the eastern coast of Africa and Hindustan. When the sun is in the southern hemisphere a north-east wind, and when it is in the northern hemisphere a south-west wind blows over this sea. When the sun passes the equator the winds are variable, and accompanied with gales, hurricanes, thunder-storms, and calms; but it is observed, that as soon as one of the monsoons ceases, the clouds in the upper regions of the atmosphere take the direction of the opposite monsoon, though it is not till three or four weeks afterwards that this monsoon becomes prevalent on the surface of the sea.

The north-east monsoon blows from November to March. It extends one or two degrees south of the equator. It becomes regular near the coasts of Africa sooner than in the middle of the sea, and near the equator sooner than in the vicinity of the coasts of Arabia. It blows with most regularity and force in the month of January, and especially in the most northern angle of the sea, between the island of Socotra and Bombay. This monsoon is not accompanied with rain on the eastern coast of the sea, but it brings rain to the eastern coast of Africa, where the rainy season falls between the beginning of November and the end of March. It may be laid down as a certain fact that neither of the monsoons brings rain by itself, but only when it reaches a coast after having passed over a wide extent of sea.

The south-west monsoon does not extend south of the equator, but usually begins a short distance north of it. It blows from the latter end of April to the middle of October. Along the coast of Africa, where it rather proceeds from the south, it appears at the end of March; but along the coast of Malabar, not before the middle of April: it ceases however sooner in the former than in the latter region. It is also observed that the south-west monsoon sets in sooner on the coast of Malabar than on that of Canara and Concan. At Anjengo (in 8° 30′ N. lat.) it makes its appearance on the 12th of April, and at Bombay on the 15th of April, so that it proceeds a degree farther northward in the course of three days. It reaches the coast of Arabia still later. On the sea it is a serene wind of moderate force; but when it approaches the coast of Hindustan, the atmosphere becomes overcharged with moisture, and the rain descends in torrents, but more abundantly on the southern than on the northern coast. Near Tellicherry the annual quantity of rain amounts to 116 inches, but at Bombay it does not exceed 63 inches. It was formerly supposed that the south-west monsoon was arrested by the Western Ghauts, but a better acquaintance with the table-land of Deccan has shown that the greatest quantity of rain descends on it during the south-west monsoon, and with a wind blowing from south-west. It has latterly been observed that its effects extend to the coast of Coromandel, where, during its prevalence, a few showers fall. But the farther this monsoon advances into the continent, the smaller is the quantity of rain which it causes. Northward its effects extend over the table-land of Malwa, the low country along the course of the Indus, and even to the coast of Beloochistan, as far as the Straits of Ormuz.

Both monsoons occur in the Bay of Bengal, but there they are somewhat modified and less regular. The north-east monsoon does not set in regularly before the beginning of December, when it blows from north-north-east and east-north-east. In January and February it is irregular, and frequently turns to the south-east; and in March it ceases entirely in the centre of the sea, and blows faintly in the north-eastern parts, with long intervals of calms. Though the north-east monsoon only becomes regular in December, it is preceded by heavy squalls and winds in the southern parts, especially along the coast of Coromandel; and it is during these squalls that this part of Hindustan is fertilised by abundant rains, which however are less plentiful than those brought to the coast of Malabar by the south-west monsoon. The mean annual quantity of rain at Madras does not exceed 46 inches. The south-west monsoon is more regular in its strength, but not in its direction, as it blows frequently from the south, and even from south-east, especially near the mouth of the Ganges. Little rain falls during this wind on the west coast of the Gulf of Bengal; but rain is abundant in the countries which enclose it on the north, in which direction it extends to the foot and declivities of the Himalaya mountains, and as far as the place where the Ganges issues from the range; but here too the quantity decreases as it advances inland. The mean annual quantity of rain at Calcutta is nearly 72 inches, and at Benares 40½ inches. The quantity of rain which, during this monsoon, descends on the eastern coast of the bay, is still larger, especially towards its northern recess, in Chittagong and Aracan, where, according to a rough estimate, founded on partial observations, it amounts annually to 200 inches.

The monsoons are subject to much greater variation to the east of the Bay of Bengal. In the Chinese Sea and the Sooloo Sea the wind is south-south-east when the sun is in the northern hemisphere, but it does not blow with regular force, being sometimes interrupted by high winds. It brings rain to all the countries which surround the sea on the north and east. In the southern provinces of China, in the Philippine Islands, and in the Sooloo Islands, the rainy season commences in the beginning of May, and terminates in September and October. The rains, though rather abundant, when compared with those which fall in the countries without the tropics, are much inferior in quantity to the rains in Bengal and Chittagong. It is remarkable that these rains extend to the countries surrounding the Gulf of Tonkin. The monsoon blows in these seas from north-north-west when the sun is in the southern hemisphere; but it is still less regular in its force, though more so than in the Bay of Bengal. It brings rain to the countries on the west and south of the sea, and especially to the coast of Cochin China Proper and the northern shores of Borneo, where the rains commence at the end of October and continue until March. They are more abundant than those which fall during the opposite monsoon on the northern and eastern shores of the Chinese Sea.

Along the equator, and about one or two degrees from it, it appears that the winds are subject to frequent changes; and it is also observed that the islands situated within these limits have frequent showers nearly every day in the year.

In the Java Sea and the southern parts of the straits which lead from that sea to the Chinese Sea, the wind generally blows from the west when the sun is in the southern hemisphere, and from the east when it is in the northern hemisphere; but it turns frequently to the north-west and south-east, which is also the case with the winds in the sea south of Java, and between the Lesser Sunda Islands and Australia. The westerly winds bring rain to these islands, but not in such abundance, as the south-west monsoon carries them to Malabar. During the easterly winds the air is generally dry, but sometimes there are heavy showers. In these islands neither season has that decided permanent character which distinguishes it on the continent of India, and the rains are far from being so violent. But the northern coast of Australia partakes more of the character of the season of the continent of India. The rains indeed do not seem to come down with such violence; not a drop falls during June, July, August, and September, which is also sometimes the case in Java and the Lesser Sunda Islands.

The direction of the monsoons in the vicinity of the land is frequently changed by the direction of the coast, especially when a mountain-range extends along the shores. The most remarkable instance of this phenomenon is observed

on the south-western coast of the island of Sumatra. The south-west monsoon is felt at Atcheen Head, its most northern point; but, being opposed by the range of high mountains running along the south-western coast, it is changed into a north-west wind, which blows as far south as 1° N. lat. South of the equator the wind is not south-west, but south-east, and may be considered as the trade-wind, which, as already observed, extends as far north as 3° S. lat. when the sun is in the northern hemisphere. During this period that part of the island which lies north of the equator has its rainy season, whilst the southern districts have dry weather. When the sun is in the northern hemisphere the southern portion has abundant rains, with frequent thunder-storms; and the northern enjoys a serene sky. In that season of the year the wind blows in the southern part from north-west, and is that wind which is generally called the north-west monsoon; but the northern districts are under the influence of the north-east monsoon. [SUMATRA.]

It is not easy to explain the origin of these periodical winds. It is admitted on all hands that they are only a modification of the trade-winds, produced by the peculiar form of the countries lying within and around the Indian Ocean. This modification, it is said, is produced by the difference of temperature to which the high table-lands of Asia and Africa are subject during the two great divisions of the year. When the sun is in the northern hemisphere the heat causes such a rarefaction of the atmosphere on the table-land of Asia as to make the air flow rapidly from the colder region near the equator to that quarter; and this is the south-west monsoon. When, on the contrary, the sun, during its stay in the southern hemisphere, heats the air on the table-land of southern Africa, the contrary effect takes place, and that is the north-east monsoon. This explanation however is hardly satisfactory. It is a fact that on the high table-lands the air is always in a state of rarefaction, compared with that of low countries, and that the summer-heat is never such as to cause a degree of rarefaction sufficient to produce a motion in the air from the lower countries towards the table-lands. Besides this, the Himalaya mountains, with their immensely high masses, lie in the line in which the south-west monsoon blows, and its effects are not observed to be sensible in the higher part of that range. The table-lands of Beloochistan and Arabia cannot be considered as affecting the direction of the wind, for in that case the wind would rather blow from the south-east than from the south-west. We think therefore that the cause of this modification of the trade-wind must be sought for in less remote localities. As for the north-east monsoon, we are inclined to consider it entirely as a continuation of the north-east trade-wind, which is only interrupted by the two peninsulas stretching southward into the Indian Ocean; and this interruption is the cause why it is commonly less constant and regular than the trade-wind itself. The question therefore is only why this trade-wind is interrupted by a wind blowing in an opposite direction when the sun is in the northern hemisphere. In this part of the year the trade-wind in the northern hemisphere retires thirteen degrees from the equator. [ATLANTIC OCEAN, vol. iii., p. 27.] If this fact is applied to the Indian Ocean, only the most northern recesses of the three gulfs, the Arabian Sea, the Bay of Bengal, and the Chinese Sea, would fall within its limits, and the remainder would be within the region of calms. In such a state of indifference a less powerful agency may produce a great effect. The south-east trade-wind, which, when the sun is on the north of the equator, extends to the vicinity of the equator, is prevented by the elevated table-land of Africa from proceeding in its direction, and is therefore diverted from its course. It follows the winding of the coast to the north-east; but as the coast of Africa, as well as that of Arabia, is skirted by very high mountains, it finds no way to escape in a western direction. It would however probably not acquire that degree of constancy and force by which it is characterised, if it did not blow towards a country in which a considerable rarefaction of the air is produced by the sun's approaching to the northern tropic. This is the Indian Desert, called Thurr, in which the heat in summer rises to an excessive degree, on account of its small elevation above the sea, its sandy soil, and the almost complete want of vegetation. The vacuum produced by this heat gives strength and constancy to the south-west monsoon, and carries it to the very base of the Himalaya mountains, though the desert itself does not partake of the fertilising rains which this monsoon brings to all the coasts whose mountains oppose its progress. This, we think, is sufficient to explain the south-west monsoon in the Araban Sea, where it is most constant and regular.

The south-east trade-wind, not extending to the north of the equator, cannot be considered as contributing to produce the south-west monsoon in the Bay of Bengal; and this wind therefore seems to owe its existence merely to the rarefaction of the air produced by the summer-heat in the wide plain of the Ganges; but as this plain is partly covered with trees (Sunderbund and Tarai) and nearly everywhere with vegetation, the effect of the heat on the temperature of the air is less regular; and thus it may be explained that the south-west monsoon in this sea is less regular and constant. The vegetation which covers the Gangetic Plain is probably also the reason why the rains brought by the monsoon are distributed over its whole extent, whilst it passes over the dry sands of the Thurr almost without letting a single shower fall.

The origin of the south monsoon in the Chinese Sea is more difficult to explain. The great plains of Siam and Camboja, the mountain-range of Cochin China, which extends along the shores of the sea from south to north, and the plains of Tonquin, probably contribute largely to it; but we are too imperfectly acquainted with the extent and nature of these plains to be able to form a correct opinion on this point. That this south monsoon extends to the island of Formosa can hardly be adduced as an objection to this explanation, when it is considered that the north-east trade-wind retires to the most northern corner of the Chinese Sea, and is there very feeble and irregular.

As for the monsoons of the Java Sea and of the seas between the Lesser Sunda Islands and Australia, they seem to owe their origin principally to the changes of temperature which occur in the countries lying along the northern coast of Australia, of which we have no information at all.

(Forrest on 'Monsoons,' in *Journey to the Mergui Archipelago;* and Capper on *Winds and Monsoons.*)

MONSTER, an individual in whom one or more of the organs or parts of the body present some congenital malformation, in consequence of which the affected being differs more or less in appearance and internal structure from other animals of the same species or sex.

The term monstrosity is often applied to those anomalies only which are apparent externally, and which produce more or less deformity; but, in a scientific point of view, it includes every variation, either external or internal, in any organ, from its most general or natural conformation; and it is in the latter sense that we shall here treat of it.

Monsters were formerly regarded as sports or prodigies of nature, and these ignorant notions, with respect to their true character, continued prevalent among all classes of people until the commencement of the last century, and are even now held by the uninformed. By the physiologist however the study of the various anomalies of organization in man and animals is now viewed as a branch of natural science. Accurate anatomical examination of numerous monsters, and a minute acquaintance with embryology and comparative anatomy, have shown that the formation of those different imperfect beings is governed by the same laws which preside over the formation of perfect individuals; the only difference being, that the process of development in the former cases has been perverted or arrested in its course during the growth of the embryo.

1. *Classification of Monsters.*—In consequence of the immense number and variety of forms of monstrosity (there being scarcely any part in any species of animal which has not been observed to depart from its usual form and structure), it becomes absolutely necessary to arrange them according to some system. Though the necessity of a classification is generally admitted, authors greatly differ in the methods which they have adopted; some basing their arrangements upon the forms or peculiarities of the monsters themselves, and others upon the theoretical ideas which they may hold concerning the causes which produce them. The system most generally followed is that which was proposed by Buffon, and which has been adopted with some modifications by Blumenbach and Meckel. Buffon formed three classes: in the first he included all those cases in which the parts of the body are increased in number, constituting monsters by excess; the second contained those beings in whom fewer than the usual number of organs are

met with, or monsters by default; and in the third he placed the various irregularities in size, relative situation, and structure of parts, which so often occur. The classification proposed by Meckel (*De Duplic. Monst. Comment.*, p. 2), differs from that of Buffon in the addition of a fourth class, including the different forms of hermaphrodism only. The simplest classification of monsters, being that which excludes all theory as to their causes, is to distribute them according to some simple and obvious characters, either depending on the degree of unnatural change, or the region or system of organs affected; and such is the kind of classification which we shall adopt in the present article.

Monsters may be first divided into simple and compound, the first of which only contain the elements of a single individual, while in compound monsters the constituent parts of two or more beings are united. Simple monsters may be again distributed into three classes, which, though not all distinguished from each other by any precise characters, are yet sufficiently distinct for purposes of arrangement.

In the first of these classes may be included those congenital varieties of conformation which are simple and uncomplicated, only affecting one organ or system of organs, and in most cases not interfering greatly with the performance of any vital function.

The second class, on the contrary, contains all those cases in which the degree of malformation is so extensive as to produce great alteration in the anatomical and physiological relations of organs, as well as, in most cases, serious external deformity and disturbance of the vital processes. M. Isidore Geoffroy St. Hilaire (*Hist. des Anomalies*, tom. 1, p. 79) is of opinion that the term monster should be confined to these more complex cases, and thinks that all the other kinds of malformation, with the exception of the compound monsters, should be simply denominated anomalies, but this distinction is arbitrary and inconvenient; indeed, in dividing this class from the previous one, it is exceedingly difficult to say where one begins and the other leaves off; and, consequently, to know in which of them to arrange many cases.

The third class may be very clearly defined, for all the malformations which it includes affect one system of organs, namely, those of generation. The monsters in this group are denominated hermaphrodites, the sex being imperfectly developed, and both sexes, or some of their characters, being present in one individual.

An immense number and variety of anomalies are included in the first class, which may be again subdivided into orders, according to whether the malformation affects the size, form, or structure of organs, or produces an alteration in the mode of arrangement and connection, or even in the number of parts. It is often found however, that two or more of these varieties of malformation exist together in the same monster; thus in Cretins and idiots, both the size and form of the skull and brain are frequently altered; and in club-foot we find a great change both in the form, structure, and position (or arrangement) of the affected limb. Simple alterations in the size or form of parts are so common, that no other examples of them need be adduced, but some very interesting changes in the intimate structure of the tissues of the body have been met with; and particularly that peculiar absence of the colouring matter of the skin which characterises the state called albinism. A description of this curious anomaly has been given in the article Albino, and we shall only here state that its origin must be accounted for by simple arrest of the process of development. M. I. Geoffroy St. Hilaire says (*Hist. des Anom.*, tom. i., p. 319), 'The pigment,' or colouring matter of the skin, 'is wanting in the fœtus up to a very advanced period of intra-uterine life, and even in black or dark people the integument remains, for some time after birth, of the same colour as in the children of fair men. We can easily conceive therefore that the skin may stop in the series of its stages of development, before the period when, in the natural order of formation, the pigment is deposited in the mucous layer, and consequently it will remain uncoloured. The colouring matter of the skin and hairs, the iris and the choroid, may thus be deficient in an individual (independently of any pathological alteration), in the same manner as any organ or part of an organ may be wanting from arrest of development.' 'If any doubts remain regarding this explanation, they are removed by the circumstance that the absence of pigment is not the only condition of fœtal life which is preserved in albinism. We know that the fœtus, during the latter part of pregnancy, has the skin covered with down; and this down is frequently preserved in albinos, particularly in those which are met with on the isthmus of Panama. Lastly, the persistence of the membrana pupillaris in some of these cases beyond the ordinary term of its existence, is another equally evident proof of arrest of development.'

Many curious anomalies in the position and connection of parts have been met with, and it has been observed that organs are subject to changes of position in proportion as they are loosely connected with the surrounding parts at an early period of development. The walls of the abdominal and thoracic cavities are thus much less subject to alterations in the position of their component parts than the organs which are loosely contained within them. The viscera have been found removed from one part of their natural cavity to another, or transported into a neighbouring cavity, as from the abdomen to the chest; and some of the organs may protrude externally, when the malformation receives the name of a congenital hernia. But of all these anomalies the most curious is that in which the viscera are generally inverted, all the thoracic and abdominal organs presenting exactly an opposite arrangement to that which constitutes their natural state; the liver, cœcum, three-lobed lung, and all those parts usually found on the right side, being transposed to the left; while the heart, spleen, sigmoid flexure of the colon, &c., are found on the right. It is the peculiar characteristic of this monstrosity, that though the actual situation of the viscera is changed, their relative situation and connections are preserved as in the natural state; and consequently their different functions are not in any way disturbed. In most, if not all, of those individuals in whom this transposition of organs has been observed, the existence of the anomaly has not even been suspected during life, which, as in the celebrated case communicated by Méry to the Academy of Sciences (of an invalid soldier, aged 72), may be prolonged to its ordinary term. The causes of this malformation are exceedingly obscure, but it seems probable that general change of position of all the viscera depends on some original alteration in the situation of one important organ, as the heart or liver; for we know that many organs are connected by their functions, or by the medium of large blood-vessels, in such a manner as to acquire a certain relative situation to each other, which also becomes necessary to preserve the general shape of the animal. Accordingly we find that when any important viscus is changed in its situation, other viscera are affected in a similar manner. In the earlier periods of the evolution of the fœtus, several of those organs which afterwards incline to one side are naturally placed in the centre of the body, or in the median line: this is the case with both the heart and liver. The knowledge of this fact enables us to understand more readily how these parts may at a subsequent period incline to the opposite side to that on which they are usually found; though we are unable to explain the mode in which they change the direction of all the other abdominal and thoracic viscera.

Together with the alterations of connection, we must place those cases in which, from arrest of development, different organs, naturally entire, are apparently divided into two or more portions, as in Hare-lip and Spina bifida. The latter of these malformations consists in a division or fissure of the posterior part of the rings of the vertebræ, either in one region of the back (as is most common), or throughout the whole spine. The mode in which the production of these and many other anomalies of the same nature can be explained by arrest of development, is by a knowledge of the method by which parts are formed. It has been observed in some organs (and the same thing is supposed by analogy to take place in almost all), that the growth goes on from the circumference towards the centre, and that the lateral parts of any single organ are developed before the central parts, and thus, at an early stage of fœtal life, hare-lip and spinal fissure are natural conditions of the embryo. If the process of development becomes arrested by any accidental cause, these states will become permanent, and the child will be malformed.

We have shown that arrest of development may produce unnatural separation of parts, and it may also occasion the closure or connection of parts naturally open or separate. Thus we frequently meet with deficiency of one or more of the orifices which open on the surface of the body, and particularly of the anus. In this case the intestinal canal may be perfect, and its orifice only closed by a membranous fold,

or it may be very incomplete, and terminate in a cul-de-sac at a greater or less distance from the situation of its natural outlet. This anomaly is easily explained by the mode of formation of the alimentary canal, which is originally a prolongation of the intestinal vesicle, which gives rise in one direction to the stomach and upper part of the digestive tube, and in the opposite direction to the inferior or descending part of the intestines. The formation of either of these portions may be arrested in any part of its course (the canal terminating in a blind extremity), though the large intestines, as the colon or rectum, are most commonly the seat of this anomaly, which, on account of the serious interference which it occasions in the functions of nutrition, speedily destroys the life of the child, unless it can be removed by surgical art.

Monsters sometimes present irregularities in the number of parts which they possess, being either furnished with supernumerary organs or exhibiting some deficiency. An order of monsters thus composed of deviations from the natural number of parts seems to be clearly distinguished from all others; but if we carefully examine the different cases which it comprises, we shall find that a great many of them may be arranged together with cases belonging to other orders of monstrosity, being in fact referrible to some alterations of volume or change of connection in the affected parts. Thus when an organ is apparently deficient, it is often possible to detect the rudiments of it by a careful dissection, and therefore, though much diminished in size, it still exists. In the same manner when supernumerary parts are added to any organ, anatomical examination will sometimes show that there is no real formation of new parts, but only an increased development of those structures which commonly remain in a rudimentary state. In many cases also the deficiency or addition of organs, as supernumerary fingers or toes, and *vice versâ*, may be explained by the complete division of one part into two, or the intimate union of two or more parts.

The development of supernumerary mammæ is one of the most frequent anomalies of this kind which occur in the human subject. There is commonly only the addition of one extra gland in these cases, making three breasts, but both four and five have been occasionally seen. When four exist, they are generally arranged symmetrically two on each side of the chest. When three or five are present, the odd one may be placed laterally beneath one of the others or in the median line: when in the latter situation, it has been remarked that it is generally small and rudimentary, which may be owing to the mode of distribution of the mammary arteries which run parallel down the sides of the chest. A very remarkable but rare anomaly in man is the existence of a mamma in the inguinal region; one or two authentic cases of this kind are recorded. (*Journal Gen. de Médecine*, tom. 100, p. 57.) The only theory which explains these anomalies is that which Geoffroy St. Hilaire has denominated the 'law of unity of organic composition.' This naturalist supposes that the whole animal kingdom is formed upon a common type, the organs of different animals in the earliest states of the embryo being all similar, but during their development assuming different forms in different animals; some parts being highly developed in one species, and remaining in a rudimentary state in others. Almost all the mammalia have several mammary glands disposed in two parallel series; and though two are only naturally developed in man, yet we may suppose that the elements of others have existed at an early period, which become developed in these anomalous cases by excess or irregularity of the formative process. The bones, muscles, vessels, viscera, and other organs, have all been frequently observed to present alterations in the number of their parts. Many cases are related by authors of an increase or diminution in the number of the cavities of the heart; three ventricles have been met with (Chemineau, *Hist. de l'Acad. des Sciences*, 1699); absence of both the auricles has been observed (Turner, *Journal Gen. de Médecine*, tom. 96); and many anatomists have described hearts which were furnished with only a single auricle and ventricle, as in fishes: cases are even related in which two distinct hearts have been found in the same individual, but their authenticity must be doubted. An unnatural number of teeth has often been observed. Arnold (*Obs. Physic. Medic.*, p. 69) mentions a case in which there existed 8 incisor, 4 canine, and 24 molar teeth, in each jaw; making together 72. The truth of this case may well be suspected, though many instances of the presence of several supernumerary teeth have been recorded by other authors.

The second class of simple monsters, comprising the various forms of extensive malformation, contains an immense number of different cases. Some monsters, though greatly altered both in form and structure, are yet capable of living for a considerable time after birth; others, on the contrary, are entirely destitute of the power of supporting an independent vitality, and may be so imperfectly formed that the symmetry of the body is lost, and nothing remains but an irregular shapeless mass. Malformation often affects only one region of the body in monsters, the other parts remaining comparatively natural: thus the limbs are frequently very much altered in structure and appearance, and may be even entirely deficient, in cases where the head and trunk preserve almost their regular form. Monsters have been seen in whom the hands or feet were alone developed and inserted immediately upon the trunk. From a fancied resemblance between the state of the limbs in these monsters and their natural state in the seal and other amphibious animals, the name *Phocomeles* has been applied to them. M. Duméril (*Bull. de la Soc. Philomathique*, tom. iii., art. xi.) has described a man who was affected with this anomaly, and who died in Paris about the year 1800, at the age of 62. His body was carefully examined after death, when all four limbs were found alike deficient: the two clavicles were very short and thick; the humeri and bones of the fore-arm did not exist at all, but the hands were articulated by the bones of the wrist immediately to the scapula. In the abdominal limbs the head of the femur and the trochanters were found on both sides, and a rudimentary tibia existed which was articulated with the foot, but had no connection with the short thigh-bone. The hands and feet have sometimes been found wanting in cases where the whole or part of the arms and legs were developed, which terminated in a rounded extremity or stump; and lastly, one or more of the limbs in man and different animals have been found entirely deficient. In another family of monsters, denominated *Symeles*, or Sirens, the two thoracic or abdominal limbs are fused together into a single member: thus the two legs have been seen united into one, and furnished with either a double or single foot, or terminating in a point or stump. These monsters are generally malformed in some other respects, and mostly die soon after birth.

The trunk may be the principal seat of malformation, while the head and limbs only slightly participate in it. In monsters of this kind eventration has generally been found, accompanied with other anomalies. Eventration consists in imperfect development of the walls of the abdomen, and consequently protrusion of the greater part of the viscera, which form a large tumour in front of the abdomen, which is only covered by a thin and delicate membrane, consisting of the dilated base of the umbilical cord. This anomaly may be solely confined to the abdomen, or it may also implicate the thoracic viscera: thus if the eventration occupies the upper part of the abdomen, the sternum may be divided by a fissure, or may even be completely wanting, so that hernial displacement of the heart will take place. Where the sternum and chest are implicated, the diaphragm is also imperfect, being partly wanting or divided. (I. Geoff. St. Hilaire, *Hist. des Anom.*, t. xi., p. 283.) When the eventration occupies the inferior regions of the abdomen, the urinary and genital organs are often imperfectly developed, as well as in some cases one or both of the abdominal limbs.

Extroversion of the bladder is one of the best known anomalies of this class. In this malformation there is both displacement and imperfect development of the bladder itself, as well as of part of the walls of the abdomen, the front wall of the bladder is deficient, and the mucous membrane of its posterior side is retroverted, forming a soft, red, projecting tumour above the symphysis pubis. On the surface of this tumour, towards the lower part, two apertures may be observed, from which the urine is constantly trickling: those are the orifices of the ureters. Extroversion of the bladder does not seriously impede the performance of any of the vital functions, and therefore is not incompatible with prolonged life; but the more complicated forms of eventration are necessarily fatal.

In both the preceding families of monsters the head is slightly if at all deformed; but many instances have been met with in which the head and face are the parts most extensively altered, though it has been observed, that whenever serious malformation of the cerebral organs takes

place, some other parts of the body participate in the anomaly. The brain has often been found imperfectly developed, and situated wholly or partly without the cranial cavity, the walls of which were incomplete. In these monsters, which have been named *Exencephali*, the brain may protrude through an opening in the posterior or occipital region of the skull, or in the anterior or frontal region. This hernial displacement of the brain is often complicated with eventration or spinal fissure. The brain in some cases has been found entirely deficient, and the vault of the cranium absent, a bright red-coloured tumour composed entirely of vessels lying on the base of the skull, and partly occupying the place of the brain: in a few monsters of this kind the vertebral canal has been seen widely open, and the spinal marrow also deficient, the vascular tumour sometimes existing and sometimes not.

The face in some monsters is the principal seat of anomaly, and no form of monstrosity has attracted more attention than that denominated *Cyclopia*, in which, from atrophy of the nasal organs, the eyes approach and unite in the median line. In some of these beings, which have also been called *Cyclocephali* by Geoffroy St. Hilaire, the two eyes are placed very close together, but still remain distinct, the bony parts of the nose being entirely atrophied, but the soft and tegumentary parts remaining in the form of a proboscis, or trunk, situated above the orbits, which, though closely in contact, are not blended together. In others only one orbital cavity has been found, containing a double eye, the component parts of which are sometimes so blended together, that only a few traces of duplicity remain; thus the cornea, pupil, and crystalline lens have been found quite single in these cases. (St. Hilaire, *Histoire*, *&c.*, t. ii., p. 387.) None of these single-eyed monsters have ever been known to live for more than an hour or two after birth, and their speedy death must be accounted for by the imperfect state of the brain, which constantly accompanies this anomaly. Malformation of the head is sometimes carried to such an extent, that the natural structure becomes completely lost, and a mere shapeless mass remains; and lastly, in those monsters to whom the denomination of *Acephalous* is correctly and should be exclusively applied, the head is entirely deficient, no external vestiges of it remaining. In these very imperfect beings other parts of the body always participate in the malformation; the symmetry of the form is lost, one or both of the superior extremities are generally deficient, and many of the thoracic and abdominal viscera wanting: the heart and lungs have been found absent in most cases; and some writers have remarked that the heart is never found in acephalous fœtuses, but the testimony of many observers has proved that this is incorrect. (St. Hilaire, *Hist.*, tom. ii, p. 507.) M. Serres has related a curious case (*Bull. de la Soc. Méd. d'Emulation*, Sept., 1821), in which an acephalous fœtus was furnished with a simple tubular heart resembling the dorsal vessel of insects, into which the principal vascular trunks opened. This case is peculiarly interesting, since we know by the researches of embryology that the heart first appears in the embryo in the shape of a long tubular pouch, which ordinarily transient state had doubtless become permanent in the above monster by arrest of the process of development.

Some of the irregular shapeless masses generally called moles, consisting of different organic parts, as teeth, bones, hair, skin, &c., which are occasionally found in the uterus or ovaries, must be considered as the imperfect products of conception, and therefore arranged among single monsters. But we must distinguish these cases from others which often very closely resemble them, in which tumours of a similar kind have been found in the ovaries of virgins, and even of girls before puberty, the occurrence of which must be explained in quite a different manner, either by the action of some morbid process in the system, or by the theory of monstrosity by inclusion, which supposes that the elements of one being have been originally enclosed in the body of another, where they have remained in an imperfectly developed state.

The last class of simple monsters includes the various forms of hermaphrodism. An hermaphrodite was defined by the antients as an individual capable of fulfilling by turns the reproductive functions of both sexes, or at least one who simultaneously possessed both the male and female organs fully developed; such a being however is not only unknown among the authentic details of anomalies, but is physically impossible in man and the higher orders of animals without extensive alteration in the connections of the bones and other parts of the pelvis. The signification of the term hermaphrodism is now much extended, and it is used to designate an individual who possesses any mixture of the characters of the two sexes. An immense variety of these malformations of the generative organs has been observed; but in most cases the malformed being belongs essentially to one or the other sex, and is only related to the opposite sex by some few characters. The two families of male and female hermaphrodites have been thus formed, which include a great proportion of the cases which have been met with. In both of these forms of anomaly, by a careful investigation during life, or dissection after death, it will be found that all these beings are essentially male or female.

In a few cases of what have been denominated neuter and mixed hermaphrodism, the organs belonging to the opposite sexes seem to have been so blended together in the same individual, that the being could not be referred to one sex rather than the other, but these instances are very rare. A most curious instance of this description is given by Schrele, a German anatomist. (*Med.-Chir. prakt. Archiv. von Baden*, *&c.*, t. i., 1804.)

The mode of origin of hermaphrodism is very obscure, though the first mentioned forms of this anomaly may most probably be referred to some arrest or excess in the process of development, since in the early stages of embryonic life a very close resemblance exists between the generative organs in both sexes.

We now come to those curious and interesting anomalies in which the component parts of two or more distinct beings are united in one individual, forming a compound monster. The two subjects composing a double being may possess an equal degree of perfection, or be very dissimilar in size and structure, one appearing as a mere parasitical appendage of the other: thus two individuals nearly perfect and distinct may cohere together by one region only of the body, or an apparently single trunk may be furnished with two heads or four arms; the multiplication of one or more of the extremities constitutes in fact the first degree of double monstrosity. In some cases every limb is doubled, and the individual then has eight extremities; in others there is only one supernumerary extremity, which, in some cases, has been observed single at its origin and doubled or tripled towards its termination, as when two or three feet are attached to the same leg. (Andral, *Anat. Pathol.*, vol. i.) It has been observed that in whatever manner or degree two beings are joined together, they are always united by corresponding aspects of the body, that is to say, side to side, face to face, or back to back: each part and each organ in the one corresponds to the same part or organ in the other; every vessel, nerve, or muscle situated in the line of union joins itself to the corresponding vessel, nerve, or muscle in the other subject, in the same manner as the two primitive halves of any single organ, which, according to M. Serres's theory of eccentric development, are originally separate, unite by the progress of development.

We have already said that the two subjects composing a double monster may be both nearly perfect and distinct, only adhering together by one region of the body. Beings of this description are sometimes capable of supporting an independent vitality for a considerable number of years, though they are mostly destroyed during parturition, their structure occasioning great difficulty to the process of delivery. One of the most remarkable cases of complete double monstrosity was that of the double female who was born in Hungary in 1701, and christened by the two names of Helen and Judith. This monster was shown about for seven years in almost all the countries of Europe, and lived to the age of twenty-two years. The two individuals, which were each quite perfect, except at the point of union, were here placed back to back, and united by the buttocks and part of the loins. The external organs of generation offered evident signs of duplicity, though there only existed a single vulva, which was placed inferiorly and hidden between the four thighs; the vagina was at first single, but soon divided into two distinct canals, which led to separate uteri. The two intestinal canals likewise terminated in a common anus, and the vertebral columns were united at their extremities. The aortæ and venæ cavæ communicated at their lower part, and thus established a large and direct communication between the two hearts, producing an intimate relation of life and functions between the two beings. Whenever one

was ill the other felt so too, and participated in her sister's disease; it was therefore predicted that the death of one would necessarily destroy the other, which proved to be true. Judith, at the age of twenty-two years, was attacked with disease of the lungs and brain, of which she died. Helen, who, at the commencement of her sister's attack, was in perfect health, soon became ill, and both expired at almost the same instant.

The junction of two fœtuses may take place by almost any region of the body; thus they have been seen attached to each other by the crown of the head, both being placed in a straight line (Villeneuve, *Description d'une Monstruosité, &c.*, 4to., Paris, 1831); by the anterior portion of the thorax, or abdomen, or by part of the front of both, as occurred in the well-known double monster which was exhibited in London in 1829-30, and denominated the Siamese twins. In this instance the two brothers were only furnished with a single umbilicus. Two varieties have been observed in the mode of junction wherever situated; in one the attachment is superficial, being effected only by the skin and bones; in the other it is more deeply seated, the cavities of the body at the point of union communicating in the two individuals, or being in fact converted into one; thus, the chests being united, the sternum may be altogether deficient; and the thoracic cavities thrown into communication, in which case the viscera frequently present some anomalies in form and arrangement. Sometimes there are two hearts, which are perfectly distinct, and enclosed in separate pericardia; sometimes the hearts, though both well formed, are contained in one common pericardium, in which they may be either distinct from each other, or superficially joined at some point. In other cases two hearts are found, but both in a very imperfect state; lastly, there may be only one heart presenting several vices of conformation, as three or four ventricles, or one of the two ordinary ventricles unusually large, and partly divided by a septum. In other cases of this description the heart has been found single and well formed, but the large vessels have been all double, so that two aortas sprung from the left ventricle, &c.

In some instances of double monstrosity the component individuals are distinct and separate at their lower halves, but more or less intimately united at the upper part of their bodies, so that they appear to have a double body and single head. In others, on the contrary, there are two distinct heads, and the upper part of the body is double, while the pelvis and inferior extremities are nearly or quite single. In some cases belonging to the former of these divisions the separation of the bodies is only complete inferiorly, all the parts above the umbilicus manifesting a tendency to coalesce: in others the separation is perfect as high as the neck. In all these instances however the head and upper part of the body, although apparently single, almost invariably present on dissection some supernumerary parts, which clearly indicate their double origin. Those compound monsters which are furnished with two heads and a single body offer numerous varieties; the head may be double, but not distinctly divided, there being two faces, more or less perfectly formed, placed side by side, and separated by a longitudinal division; each face is generally provided with a pair of eyes, but sometimes there are only three, one being placed in the median line and formed by the union of two together, as in cases of Cyclopia. The two heads may be completely double, but the body and extremities single. Lastly, the heads and upper halves of the bodies may be separate, there being four upper extremities, while the monster is only single by the pelvis and lower extremities. A human monster of the last kind, which lived to be nine months old, excited great interest in Paris in 1829; it was a double female, and denominated Rita-Christina. It was born in Sardinia, and was brought to Paris to be publicly exhibited. It was carefully examined after death, and a detailed account of its structure has been given by M. Serres, in his *Recherches d'Anatomie Transcendante, &c.* The two vertebral columns were found quite distinct in their whole length, and a rudimentary pelvis separated them inferiorly: another fully developed pelvis was found in its natural position, which supported two well formed abdominal limbs. There existed a single bladder, uterus, and rectum, which were common to the two subjects, but behind these organs were found rudimentary traces of others. There were two distinct hearts, and all the other thoracic and most of the abdominal viscera were double.

A singular and unique case is recorded by Sir E. Home (*Philos. Trans.*, vol. lxxx., p. 296, and vol. lxxxix., p. 28; also in *Lectures on Comparative Anatomy*, t iii., p. 334), of a fœtus with an accessory head, which was implanted by its summit on to the crown of the natural head. The body of this child was well formed in every respect, having no supernumerary parts, and the principal head was quite natural in appearance, except in the parietal region, where its integuments were continued into those of the accessory head. The latter was placed in an entirely inverted position, the neck, which terminated in a round tumour, being directed upwards and a little backwards. This monstrous child, which was born in Bengal in 1783, lived to be four years old, and then only died from the bite of a serpent. In this case, which must be included with those of double monstrosity, we must suppose that the body and limbs belonging to the accessory head had become completely atrophied, but it is exceedingly curious how this remaining part continued to live solely by means of vascular and nervous communication with the principal individual, and without any separate umbilical cord or special organs of nutrition.

The last variety of monstrosity which we shall mention is that by inclusion. In these cases fragments of one fœtus have been found contained in the interior of another. A case of this kind is recorded by M. Dupuytren (*Bull. de la Faculté de Médecine*, vol. i.), who found a cyst in the transverse mesocolon of a boy thirteen years of age, containing an organised mass, which, when carefully examined, presented traces of the brain, spinal marrow, nerves, muscles, and most of the bones of a fœtus, but no vestiges of the organs of digestion, respiration, or circulation. Similar substances have been found in various situations in other subjects, and there is no doubt of their nature; though the mode in which the germ of one fœtus has become included in the body of another is at present entirely unknown.

Compound monsters, formed by the union of more than two distinct individuals, are exceedingly rare, and very few authentic cases of such anomaly are on record.

None of the different theories which have been proposed in explanation of the mode of origin of single monsters throw any light on the causes of compound monstrosity. It is very difficult to decide whether the germs have been originally double, or whether two or more have become united during the progress of development. The latter is the most general opinion; and the most probable idea respecting their mode of union is, that two ova become adherent whenever they are contained within the same membranes, and opposed to each other by corresponding aspects of the body.

2. *Predisposing and exciting Causes of Monstrosity.*—Of these little is known; for while the influences determining the phenomena of normal development are hidden from us, those presiding over irregular formation must necessarily be involved in darkness. In the article FŒTUS it is stated that the organs of the embryo are generally considered to be successively developed, and not evolved from originally pre-existing elements: the notion therefore that the germ of the future embryo is ever originally monstrous previous to impregnation must be abandoned, and the causes giving rise to the various forms of congenital malformation must be sought for in some accidental influences disturbing or arresting the process of development in the embryo. Direct evidence has been afforded by experiment that the natural stages of formation may be so altered in the embryo of the chick during incubation by external injury. Geoffroy St. Hilaire injured several eggs in which the process of incubation had commenced, and had been going on naturally for several days. He shook some of them violently, he perforated the shell of others in different places with a sharp instrument, or kept them in a vertical position, upon either the large or small end, during the whole time of hatching; again, in some he covered part of the shell with wax, or a varnish impervious to the air. The constant effect of these injuries was the production of a very considerable number of anomalies, either simple or complicated, among which may be mentioned *cyclopia* and other malformations of the face and head, eventration, and spinal fissure. In no instance was any case of double monstrosity met with, which might, *à priori*, have been supposed; a double monster being composed of two distinct embryos, the germs of which must have previously existed in the same egg. (*Mémoires du Muséum* tom. xiii., p. 289; also *Journal Complément. des Sci. Méd.*, tom. xxxiv.)

The younger St. Hilaire repeated these experiments in a different manner, altering the structure of eggs previous to the commencement of incubation, and not during the course of this process, as had been done by his father. His experiments were attended with quite a different result: the more violent disturbing influences destroyed the vitality of the embryo altogether; others, less active, produced general retardation or arrest of the process of development of the whole body; but in no instance was malformation of any one region or part effected. (*Hist. des Anom.*, tom. iii., p. 503.) These experiments confirm the opinion that anomalies involving a single individual must principally be referred to the influence of some disturbing causes occurring during the process of development. In some instances the birth of a monster has undoubtedly followed an accident received by the mother during the early months of gestation, such as a fall, a violent blow on the abdomen, or some long-continued mental impression or anxiety. The influence of such causes is however much weaker than has been supposed; for how many examples occur every day of women producing well-formed children who have been suffering under violent moral emotions, or who have received serious accidents during pregnancy. It is unnecessary to bring forward any arguments to refute the antient superstitious notions of the vast influence which the imagination of the mother was supposed to exert over the formation of the fœtus. It is no longer supposed, except by the ignorant, that any object which has been seen or longed for by the parent can be depicted on the body of the child; and in most cases where the child has been supposed to have been deformed through the influence of any such cause, if the date of the impression received by the mother be carefully ascertained, it will be found that the organ supposed to be altered or marked by such impression must have been nearly or fully developed at the time that it was received, and therefore could be in no way affected.

Another very generally admitted cause for some malformations is the occurrence of disease in the fœtus itself, and there is no doubt but that some cases of *anencephalia* and other malformations of the brain and spinal chord must be referred to dropsical disease occurring in the interior of the skull and spine of the embryo; but in the majority of cases this explanation is inadmissible, and supported by no proofs. Many other hypotheses have been proposed to account for the production of monsters, as adhesions between the fœtus and its investing membranes; modifications in the quantity and quality of the nutriment received by the embryo; pressure made on the fœtus by tumours attached to the parietes of the uterus, &c. It is unnecessary to enter into the consideration of these causes; for, after all, we can only arrive at the conclusion that the development of the embryo in anomalous cases has been diverted from its natural course, or arrested by some accidental cause, which, whether taking its origin in the fœtus itself, or acting secondarily on the embryo, is involved in obscurity.

Though the occurrence of accidental causes acting during the process of development will account for most of the phenomena of monstrosity, yet it will not account for all. It has been observed that some malformations are hereditary, are transmitted from fathers to children; and since all influence of the father on the child must cease with the act of fecundation, these anomalies must be dated from the moment of conception.

3. *Laws of Monstrosity.*—From extended observation it has been found that all the forms and varieties which monstrosity presents are apparently under the control of certain fixed laws; or, in other words, there appear to be a number of general facts which are applicable to all cases of malformation. Some of these facts it is necessary to be acquainted with, since, by a knowledge of them, we may often be enabled to distinguish (when reading or hearing descriptions of monsters, or looking at figures in old works) those anomalous cases which may really have existed, from others which are only the fanciful and absurd productions of a fertile imagination. To one of these laws we have already alluded, for instance, the fact that union between two individuals forming a double monster always takes place by corresponding parts of the body; and we shall now briefly mention several others.

Monstrosity, however complicated and extensive, is never carried to such a degree as to remove the animal affected with it out of the series of natural beings in which it has been originally placed; no entire being nor organ has ever been met with so deformed that the species to which it belonged could not be recognised. Again, in the most extensively deformed monsters the relative connections between different organs are never so completely altered that it becomes impossible to distinguish them by the position which they occupy. Thus the heart has never been found in the cranium, nor the lungs in the pelvis.

Anomalies are more frequent in proportion as they do not affect vital organs nor interfere with any important functions. Thus we very commonly meet with irregularities in the course of blood-vessels, since it signifies little through what channels the blood is conveyed, so that it arrives at the organ which it is destined to supply. It has also been found that the parts most liable to vary are those which are the latest in attaining their complete evolution; and this fact may very readily be explained, for if the process of development be disturbed or arrested by any cause during the course of fœtal life, those organs which are already nearly or fully formed at the time of the occurrence of such disturbing influence will be little or not at all altered, while on the contrary complete suppression or a very marked alteration may be effected in other parts whose formation has not commenced or is very imperfect. This fact has been explained in another manner, by supposing that different organs are subordinate in their formation one to another, one being produced by another whose development preceded it. Thus the suppression of any part will not influence those which have been previously formed, while it must necessarily lead to the complete absence of all those which ought to have followed it in the order of development.

A kind of compensation or balancing has sometimes been observed between different organs in monsters; excess of development in one part being accompanied with a corresponding arrest of formation in some other organ. Thus an individual having several supernumerary fingers or toes on one hand frequently has the opposite limb furnished with fewer than the usual number, and monsters deprived of the brain have been observed to have the face unusually large. Many other applications have been made of this law of compensation, as it has been termed by Geoffroy St. Hilaire.

It has been said that the left side of the body is more frequently deformed than the right, and that a greater number of monsters belong to the female than to the male sex, which last fact Meckel explains by the theory that the generative organs are in both sexes originally female, and that many monsters remain of that sex by arrest of development, who, if naturally formed, would have been males.

For further information upon the subject of monstrosity the reader may particularly consult Haller's treatise *De Monstris;* Meckel's *Manual of Pathological Anatomy* (German); Geoffroy St. Hilaire's *Anatomie Philosophique;* and his son Isidore Geoffroy St. Hilaire's *Histoire des Anomalies.*

MONSTRELET, ENGUERRAND DE, a celebrated French chronicle writer, lived in the fifteenth century. His quotations from Livy, Sallust, and Vegetius lead to the opinion that he must have had a tolerable acquaintance with Latin literature. M. Dacier supposes that either from bodily weakness or a predominant taste for study, he altogether abstained from the profession of arms, which at the time when he lived was almost essential to the character of a gentleman. The same author is also of opinion that he belonged to neither of the factions of Armagnac or Burgundy, nor indeed acted in any of the events of his time, but was a quiet spectator of the circumstances which he has recorded. In all his work Monstrelet only once alludes to himself, where he describes the capture of the Maid of Orleans before Compiègne (livre ii., chap. 86), and then he merely tells us that he was present at the interview between the *Pucelle* and the duke of Burgundy, and almost implies that he was not present at the skirmish in which the capture was made. He had on this occasion (says Dacier) accompanied the Duke Philip perhaps as historian. The rest of his life he passed in the city of Cambrai, where he held several offices, being bailiff of the chapter of Cambrai, provost of the city, and bailiff of Wallaincourt. He died in the middle of the year 1453.

The first book of the Chronicles of Monstrelet begins with the year 1400, and ends with the year 1422; the second concludes with 1444. The early editions contain a third

and fourth book, which are both rejected by M. Buchon, a modern editor; the latter for the obvious reason that the events which it records did not take place till after the death of the chronicler, and the former on the authority of M. Coney, who declares that Monstrelet stopped at 1444, as well as from the result of certain critical investigations on the part of M. Buchon himself.

Monstrelet is greatly commended for his minuteness of detail, his fidelity, and the extended view he takes in his 'Chronicles;' for, like Froissart, his predecessor, he does not confine himself to France alone, but gives all the circumstances relative to the affairs of the other countries of Europe which were within the compass of his knowledge. His principal object was to give a history of the wars of his time, and of the persons engaged in them, but he adds much valuable information, both political and ecclesiastical.

In France there are several manuscripts of Monstrelet. The first printed edition is a quarto, dated 1512, which was followed by four others, the last dated 1603, all containing the additional books rejected by Buchon, who however praises the third edition (1572) for its beauty. The new edition by Buchon was published in 1836, and forms part of a series of the 'Panthéon Littéraire,' in which it is designed to give all the principal chronicles of France. In 1808 an English version of Monstrelet was published by Mr. Johnes, the translator of Froissart.

MONT DE MARSAN. [LANDES.]

MONT DE PIETE' (MONTE DI PIETA', in Italian), a benevolent institution which originated in Italy in the fifteenth century, the object of which was to lend money to necessitous people at a moderate interest. The Jews, who were the great money-lenders in that age, exacted an enormous interest, and as much as 20*l*. to 25*l*. per cent. The Papal government and other Italian governments established a kind of bank, which lent money upon pledges, for a fixed term, at a low rate of interest, intended chiefly to defray the unavoidable expenses of the establishment; at the expiration of which term, if the capital lent and interest were not repaid, the pledges were sold, and the surplus money, after paying the debt incurred, was restored to the owners In most instances however the term might be renewed by merely paying the interest. The difference between these establishments and those of the ordinary pawnbrokers seems to have been that they were intended mainly for the benefit of the borrowers, and not for the profit of the lenders, and that every reasonable facility was afforded to the former. The administration of the Monte di Pietà was therefore conducted upon economical and strictly equitable principles, and it was under the inspection of the government as a public benevolent institution. This at least was the original principle, although it may occasionally have been deviated from in after-times, in consequence of the cupidity or necessities of the governments themselves. In times when capital was more scarce or less generally diffused than it is now, and when loans of money were difficult to be got, the Monte di Pietà was a most useful institution. Leo X., some say Paul III., sanctioned the first establishment of a Monte di Pietà at Rome, which was under the direction of a society of wealthy persons, who, having contributed the necessary funds, lent upon pledges small sums not exceeding thirty Roman scudi, a little more than six pounds sterling, to each person. The money was lent for a term of eighteen months. The establishment was under the inspection of the treasurer of the Apostolic Chamber. Large storehouses were annexed to the office, which stood in the district della Regola, near the banks of the Tiber. (Richard, *Description de l'Italie*, vol. v.) Other establishments of a similar nature existed at Milan, Florence, Naples, and most other towns of Italy. That of Padua is one of the oldest on record having been established in 1491, when the Jewish banks, which lent at usurious interest, were shut up. (Scardeoni, *De Antiquitate Urbis Patavii.*)

This institution was introduced into other countries, especially into the Netherlands, and Monts de Piété were established at Brussels, Antwerp, Ghent, and other places. In Spain there were also similar establishments at Madrid and some other large towns, but in no country were they so generally spread as in Italy, the original country of benevolent institutions during the middle ages.

When the French under Bonaparte invaded Italy in 1796-7, they plundered the Monti di Pietà of Milan, Modena, Parma, and most other towns. At Rome, Pope Pius VI., being pressed by the French to pay an enormous sum for war contributions, was obliged to seize upon the richer pledges in the Monte di Pietà, for the repayment of which he gave bonds; but these bonds lost all value in the subsequent invasion of Rome by the French in 1798. The Monti di Pietà have been re-established in most Italian cities.

The Monti Frumentarii, in several parts of Italy, are storehouses of corn, which is lent to poor cultivators on the same principle as money is by the Monti di Pietà. [BRESCIA.]

MONT D'OR. [PUY DE DÔME.]

MONT LOUIS. [PYRENEES ORIENTALES.]

MONT LUCON. [ALLIER.]

MONTAGNA, Dr. Leach's name for a genus of Macrurous crustaceans allied to *Callianassa*.

MONTAGU, LADY MARY WORTLEY, by birth Lady Mary Pierrepoint, was the eldest daughter of Evelyn earl of Kingston (afterwards marquis of Dorchester, finally duke of Kingston), by his wife the lady Mary Fielding, daughter of William earl of Denbigh, and was born at her father's seat of Thoresby in Nottinghamshire, about the year 1690. Displaying great attractions of person as well as sprightliness of mind from her earliest years, she was the favourite and pride of her father, who, having lost his wife in 1694, and continuing a widower, introduced his daughter to society, and made her preside at his table, almost before she had well outgrown her childhood. It does not appear however that there is any truth in the common account of his taking pains to have her talents cultivated by a learned education. What Latin she knew she seems to have acquired of her own accord; and there is no reason to suppose that she ever studied Greek, a translation made by her, when a girl, of the 'Encheiridion' of Epictetus, which has been referred to as a proof of her knowledge of that language, having been in fact made from the Latin. She was at least however an eager reader of whatever fell in her way in her mother-tongue. In August, 1712, without the consent of her father, with whose views in regard to a settlement his proposed son-in-law had refused to comply, Lady Mary married Edward Wortley Montagu, Esq., eldest son of the Hon. Sydney Montagu, and grandson of the first earl of Sandwich. Her letters to Mr. Montagu before their marriage, which have been published entire for the first time in the late complete edition of her works by her great grandson, the present Lord Wharncliffe, prove that she had already attained much of that sharpness both of style and thought for which her writings are remarkable, as well as a maturity of judgment far beyond her years. Soon after the accession of George I., Mr. Wortley, who had been for some years in parliament, obtained a seat at the Treasury Board, of which his cousin Charles Montagu, earl of Halifax, had been appointed first commissioner; and from this time Lady Mary resided principally in London, where her wit and beauty immediately acquired her a brilliant reputation. Her husband had long been on terms of intimate friendship with Addison and other eminent literary men of the day, and in that society she moved with the same lustre as in the circles of rank and fashion. In 1716, Mr. Wortley Montagu was appointed ambassador to the Porte; and in August of that year he set out for Constantinople, accompanied by his wife. They remained abroad till October, 1718, and it was during this absence from her native country that Lady Mary addressed to her sister, the countess of Mar, Mr. Pope, and other male and female friends, the celebrated Letters upon which her fame principally rests. The picture of Eastern life and manners given in these letters is admitted by all who have since visited the Levant to be in general as correct as it is clear, lively, and striking; and they abound not only in wit and humour, but in a depth and sagacity of remark, conveyed in a style at once flowing and forcible, such as has rarely proceeded from a female pen. Although they were not given to the world during her lifetime, they were evidently written with a view to publication; copies of all of them were preserved by Lady Mary, and some time before her death she presented two complete transcripts of them, the one, in her own handwriting, to the Rev. Benjamin Sowden, minister at Rotterdam, 'to be disposed of as he thinks proper;' the other, in a different hand, to Mr. Molesworth. Both these copies were procured immediately after her death by her daughter, Lady Bute, the first-mentioned having been purchased for the sum of 500*l*.; but it appeared that a transcript had been previously taken (as Mr. Sowden affirmed,

without his knowledge), and from this the Letters were published, in three volumes 12mo., in 1763, the editor, it is said, having been the notorious Captain Cleland. A fourth volume appeared in 1767, composed of letters of which no manuscript is known to exist, but of the authenticity of which no doubt was ever entertained by Lady Mary's family. As they originally appeared, the Letters were introduced by a 'Preface by a Lady,' dated 1724, and signed M. A., which now turns out to have been written by a person once of considerable literary reputation, Mrs. Mary Astell, the Madonella of the Tatler (see Nos. 32 and 63), who was a particular friend of Lady Mary, and who had drawn up the said preface after perusing the Letters in manuscript. The authenticity of the Letters was not considered to be conclusively established till the publication of the first collected edition of Lady Mary's works in 1803, in five volumes 12mo., 'by permission, from her genuine papers,' by Mr. Dallaway, who prefixed to the whole a Life of her ladyship, of very little merit in every respect. A second edition of this publication appeared in 1817, containing some additional letters; but its value has been since entirely superseded by the publication of 'The Letters and Works of Lady Mary Wortley Montagu,' edited by her great-grandson, Lord Wharncliffe, 3 vols. 8vo., London, 1836, and again in 1837. Besides presenting the letters formerly printed in a much more correct shape, this publication contains several letters and other pieces which had not before been given to the world; but it derives its chief value and interest from a new Life of Lady Mary, modestly entitled 'Biographical Anecdotes' (understood to be from the pen of Lady Louisa Stuart, the only surviving daughter of her daughter Lady Bute), which is as able and spirited as anything Lady Mary herself ever wrote, and must be considered as one of the gems of our literature.

Lady Mary's visit to Turkey, besides producing the Letters, is famous for having been followed by the introduction, through her means, into this country, and thence into the rest of Europe, of the practice of inoculation for the small-pox. [INOCULATION.] Of the next twenty years of her life, which she passed in England, the most memorable incident is her quarrel with Pope, an affair which is involved in considerable mystery, but in which it appears probable that the vanity of the poet was really more to blame than the levity of the lady. During this interval also she composed a considerable quantity of verse, which was handed about in society, and some of which got into print; but she had not much of the poetical temperament, and her rhymes, though not without sprightliness, contained nothing which could ensure them a long life. Among those of her performances in this line of greatest pretension were six satirical sketches, entitled 'Town Eclogues,' which have been often printed; others of her poetical pieces, or that have been generally attributed to her, are in so free a style, as to make it necessary to exclude them from the modern editions of her works. For reasons, the nature of which is not well known, she again left England in 1739, but this time without her husband, from whom however she seems to have parted on very good terms, although they never met again. She directed her course to Italy, where she lived first on the shores of the lake of Iseo, and afterwards at Venice, till 1761, when she was prevailed upon, by the solicitations of her daughter, to return to England. She only survived her return to her native country a few months, dying of a cancer in the breast, on the 21st August, 1762. Besides a son, the subject of the next article, she left a daughter, Mary, who had been married in 1736 to John, third earl of Bute (George III.'s celebrated minister), and who died in 1794.

MONTAGU, EDWARD WORTLEY, son of Edward Wortley Montagu, Esq., and his wife Lady Mary, the subject of the preceding article, was born in 1713, at Wharncliffe, in Yorkshire. His niece, Lady Louisa Stuart, in her biographical sketch of his mother, describes him as 'betraying from the beginning that surest symptom of moral (or mental) disease, an habitual disregard of truth, accompanied by a fertile ready invention never at fault.' When very young he was sent to Westminster school, from which he repeatedly ran away, till at last making his escape altogether from his friends, or abandoned by them as irreclaimable, he gave himself up to the lowest vices, and after going through a variety of adventures, hired himself for a cabin-boy in a ship sailing to Spain, where he was after some time discovered by the British consul at Cadiz, and once more restored to his family. He was then sent to travel on the Continent in charge of a private tutor, and it was while abroad that he published his first work, a tract entitled 'Reflections on the Rise and Fall of Antient Republics.' His literary labours however still left him leisure for pursuits of a very different kind; and while at Paris he got involved in a dispute with a Jew, which subjected him to a criminal prosecution. We presume it was after he returned to England that, while still under age, he married, as we are told by his niece, a woman of very low degree, considerably older than himself, whom he forsook in a few weeks, and never saw again. His wife, who gave him no ground for divorcing her, lived nearly as long as himself; but nevertheless, it is added, several other ladies successively passed by his name, some of whom were married to him, others possibly not; the last of them, at any rate, had, like himself, been married before to a person who was still alive.

Notwithstanding all this profligacy and disregard of reputation, Mr. Montagu, having procured a seat in the House of Commons, retained it for two parliaments, till at last his extravagant expenditure involved him in such pecuniary embarrassments that he deemed it expedient once more to go abroad. He never returned to England, but proceeding first to Italy, made himself remarkable there by becoming a convert to popery, and then transferring himself to Egypt, excited a still greater sensation by turning Mohammedan. The rest of his life he spent in the Levant, having in the mean time been disinherited by his father and mother; but he was on his way back to England when his death took place at Padua in 1776. Besides his early tract he wrote another entitled 'An Examination into the Causes of Earthquakes;' and he also contributed some papers to the 'Philosophical Transactions.' His niece concludes her account of him as follows:—'He was said to have had a handsome person, plausible manners, and a liveliness of parts which report magnified into great talents; but whether he did really possess these may be doubted. Thus much is certain;—Mr. Wortley and Lady Mary (neither of them an incompetent judge) were far from thinking highly of their son's abilities and understanding. His irregular conduct was imputed by them rather to weakness of character than to "the flash and outbreak of a fiery spirit" conscious of its own powers; and from first to last they held him utterly incapable of pursuing any object or course whatever, praiseworthy or blameable, with that firmness and consistency of purpose which perhaps belongs as necessarily to the great wicked man as to the eminently good one. They would have passed upon him the sentence of the patriarch on his first-born—"Unstable as water, thou shalt not excel!"'

Niebuhr, in the lately published volume of his Travels (Hamburg, 1837), tells a curious anecdote about Montagu marrying another man's wife in Egypt; and states some other facts which throw light on the character of this eccentric man, who seems to have had more ability than his family gave him credit for. The dislike between the father and son appears to have been mutual.

MONTAIGNE, MICHEL, LORD OF, born in 1533, was a younger son of a nobleman whose estate, from which he took his name, was situated in the province of Perigord, near the river Dordogne. His father, an eccentric blunt feudal baron, placed him under the care of a German tutor, who did not speak French, and the intercourse between tutor and pupil was carried on entirely in Latin; and even his parents made it a rule always to address him in that language, of which they knew a sufficient number of words for common purposes. The attendants were enjoined to follow the same practice. 'They all became Latinized,' says Montaigne himself; 'and even the villagers in the neighbourhood learnt words in that language, some of which took root in the country, and became of common use among the people.' Thus without the aid of scholastic teaching, Montaigne spoke Latin long before he could speak French, which he was afterwards obliged to learn like a foreign language. He studied Greek in the same manner, by way of pastime rather than as a task. He was afterwards sent to the college of Guienne at Bordeaux; and at the age of thirteen he had completed his college education. He then studied the law, and in 1554 he was made 'conseiller,' or judge, in the parliament of Bordeaux. He repaired several times to court, and enjoyed the favour of Henri II., by whom, or, as some say, by Charles IX., he was

made a gentleman of the king's chamber and a knight of the order of St. Michel.

When he was thirty-three years of age Montaigne married Françoise de la Chassaigne, in order, as he says, to please his friends rather than himself, for he was not inclined to a married life. He however lived on good terms with his wife till his death. He had only one daughter by his marriage. He managed his own estate, on which he generally resided, and from which he derived an income of about 6000 livres.

In 1569 Montaigne translated into French a Latin work of Raymond de Sebonde or Sebon, a Spanish divine, on 'Natural Theology.' France was at that time desolated by civil and religious war, and Montaigne, disapproving of the conduct of the court towards the Protestants, and yet being by education a Catholic, and by principle and disposition loyal to the king, was glad to live in retirement, and take no part in public affairs except by exhorting both parties to moderation and mutual charity. By this conduct he became, as might be expected, obnoxious to both sides. The massacre of St. Bartholomew plunged him into a deep melancholy, for he detested cruelty and the shedding of blood. It was about this dismal epoch of 1572 that he began to write his 'Essais,' which were published in March, 1580, and met with great success.

With the view of restoring his health, which was not good, Montaigne undertook a journey to Germany, Switzerland, and lastly to Italy. At Rome he was well received by several cardinals and other persons of distinction, and was introduced to pope Gregory XIII., and received the freedom of the city of Rome by a bull of the pope, of which he appears to have been very proud. Montaigne was delighted with Rome; he there found himself at home among those scenes and monuments which were connected with his earliest studies and first impressions of his boyish years. He wrote a journal of his tour, evidently not intended for publication, but the MS., being discovered after nearly two centuries in an old chest in the château of his family, was published in 1774, under the title of 'Journal du Voyage de Michel de Montaigne en Italie, par la Suisse et l'Allemagne, en 1580-1.' It is one of the earliest descriptions of Italy written in a modern language.

While he was abroad he was elected mayor of Bordeaux by the votes of the citizens, an honour which he would have declined had not the king, Henri III., insisted upon his accepting the office. At the expiration of two years Montaigne was re-elected for an equal period. On his retiring from office he returned to his patrimonial estate. The war of the League was then raging in the country, and Montaigne had some difficulty in saving his family and property from the violence of the contending factions.

At this time the plague also broke out in his neighbourhood (in 1586), and obliged him to leave his residence and wander about various parts of the country. He was at Paris in 1588, busy about a new edition of 'Essays.' It appears from De Thou's account that about this time Montaigne was employed in negotiations with a view to conclude a peace between Henri of Navarre, afterwards Henri IV., and the duke of Guise. At Paris he became acquainted with Mademoiselle de Gournay, a young lady who had conceived a kind of sentimental affection for him from reading his book. Attended by her mother she visited him, and introduced herself to him, and from that time he called her his 'fille d'alliance,' or adopted daughter, a title which she retained for the rest of her life, as she never married. Montaigne was then fifty-five years of age. This attachment, which, though warm and reciprocal, has every appearance of having been of a purely Platonic nature, is one of the remarkable incidents of Montaigne's life. At the time of his death Mademoiselle de Gournay and her mother crossed one half of France, notwithstanding the civil troubles and the insecurity of the roads, to repair to Montaigne's residence and mingle their tears with those of his widow and daughter.

On his return from Paris in the latter part of 1588, Montaigne stopped at Blois with De Thou, Pasquier, and other friends. The States-General were then assembled in that city, in which the duke de Guise and his brother the cardinal were treacherously murdered, on the 23rd and 24th of December of that year. Montaigne had long foreseen that the civil dissensions could only terminate with the death of one of the great party leaders. He had also said to De Thou that Henri of Navarre was inclined to adopt the Catholic faith, but that he was afraid of being forsaken by his party; and that on the other side Guise himself would not have been averse from embracing the Protestant religion, if he could thereby have promoted his ambitious views. After the catastrophe Montaigne returned to his château.

In the following year he became acquainted with Pierre Charron, a theological writer of considerable reputation, and formed an intimate friendship with him. Charron, in his book 'De la Sagesse,' borrowed many ideas from Montaigne's 'Essays.' Montaigne by his will empowered Charron to assume the coat of arms of his family, as he himself had no male issue.

Montaigne's health was in a declining state for a considerable time before his death; he was afflicted with the gravel and the colic, and he obstinately refused to consult medical men, of whom he had generally an indifferent opinion. In September, 1592, he fell ill of a malignant quinsy, which kept him speechless for three days, during which he had recourse to his pen to signify to his wife his last wishes. He also requested that several gentlemen of the neighbourhood should be invited, in order that he might take leave of them. When they were all assembled in his room, a priest said mass, and at the elevation of the host, Montaigne half raised himself up in his bed, with his hands joined together as in prayer, and in that attitude he expired, on the 13th of September, 1592, in the sixtieth year of his age. His body was buried at Bordeaux in the church of the Feuillans, where his widow erected a monument to him.

Montaigne's 'Essais' have been the subject of much conflicting criticism. If we consider the age and the intellectual condition of the country in which the author lived, we must consider them a very extraordinary production, not so much on account of the learning contained in the work, although that is very considerable, as for the clear good sense, philosophical spirit, and frank liberal tone which pervade its pages, as well as for the attractive simplicity of the language. Literature was then at a very low ebb in France, the language was hardly formed, the country was distracted by feudal turbulence, ignorant fanaticism, deadly intolerance, and civil factions, and yet in the midst of all this a country gentleman living in a remote province, himself belonging to the then rude, fierce, feudal aristocracy, composed a work full of moral maxims and precepts, conceived in the spirit of the antient philosophers of Greece and Rome, and founded on a system of natural ethics, on the beauty of virtue and of justice, and on the lessons of history; and this book was read with avidity amidst the turmoil of factions, the din of civil war, and the cries of persecution and murder.

The morality of the 'Essais' has been called, and not unreasonably, though not correctly in the expression, a pagan morality: it is not founded on the faith and the hopes of Christianity, and its principles are in many respects widely different from those of the Gospel. Montaigne was a sceptic, but not a determined infidel; his philosophy is in a great measure that of Seneca and other antient writers, whose books were the first that were put into his hands when a child. Accordingly, Pascal, Nicole, and other Christian moralists, while they do justice to Montaigne's talents and the many good sentiments contained in his work, are very severe upon his ethics taken as a system. A living moralist of our own time, Professor Vinet of Basle, has given a fair analysis of the spirit of Montaigne's ethics. (*Essais de Philosophie Morale et de Morale Religieuse suivis de quelques Essais de Critique Littéraire*, par A. Vinet, Paris, 1828.) In the 54th chapter of the 1st book of the 'Essais,' Montaigne, after distinguishing two sorts of ignorance, the one which precedes all instruction, and the other which follows partial instruction, goes on to say, 'that men of simple minds, devoid of curiosity and of learning, are Christians through reverence and obedience; that minds of middle growth and moderate capacities are most prone to doubt and error; but that higher intellects, more clear-sighted and better grounded in science, form a superior class of believers, who, through long and religious investigations, arrive at the fountain of light of the Scriptures, and feel the mysterious and divine meaning of our ecclesiastical doctrines. And we see some who reach this last stage through the second, with marvellous fruit and confirmation, and who, having attained the extreme boundary of Christian intelligence, enjoy their success with modesty and thanksgiving; unlike those men of another stamp, who, in

order to clear themselves of the suspicions arising from their past errors, become violent, indiscreet, unjust, and throw discredit on the cause which they pretend to serve.' And a few lines after, he modestly places himself in the second class, namely, of those who, disdaining the first state of uninformed simplicity, have not yet attained the third and last exalted stage, 'and who,' he says, 'are thereby rendered inept, importunate, and troublesome to society. But I, for my part, endeavour, as much as I can, to fall back upon my first and natural condition, from which I have idly attempted to depart.' In his chapter on prayers (b. i., 56), he recommends the use of the Lord's prayer in terms evidently sincere; and in the 'Journal of his Travels,' which was not intended for publication, he manifests Christian sentiments in several places.

Montaigne has been censured for several licentious and some cynical passages in his 'Essais.' This licentiousness however appears to be rather in the expressions than in the meaning of the author. He spoke plainly of things which are not alluded to in a more refined state of society, but he did so evidently without bad intentions, and only followed the common usage of his time. Montaigne combats most earnestly the malignant feelings frequent in man, injustice, oppression, inhumanity, uncharitableness; cruelty he detests, his whole nature was averse from it. His chapters on pedantry, on the education of children, on the administration of justice, and especially of criminal justice, are remarkably good. He also throws considerable light on the state of manners and society in France in his time.

The 'Essais' have gone through many editions: that of Paris, 3 vols. 4to., 1725, is the most complete. Vernier published, in 1810, 'Notices et Observations pour faciliter la Lecture des Essais de Montaigne,' 2 vols. 8vo., Paris. It is a useful commentary.

MONTANISTS, or CATAPHRYGIANS, a sect of Christians, which arose in Phrygia about 171 A.D. (Eusebius, *Chron.*, p. 170; and *Ecc. Hist.*, v. 3.) They were called Montanists from their leader Montanus, and Cataphrygians or Phrygians from the country in which they first appeared.

Of the personal history of Montanus little is known. He is said to have been born at Ardaba, a village in Mysia, and to have been only a recent convert when he first made pretensions to the character of a prophet. (Euseb., *Hist. Ecc.*, v. 16.) His principal associates were two prophetesses, named Prisca or Priscilla, and Maximilla. According to some of the antient writers, Montanus was believed by his followers to be the Paraclete, or Holy Spirit. Probably this is an exaggeration, but it is certain that he claimed divine inspiration for himself and his associates. They delivered their prophecies in an ecstasy, and their example seems to have introduced into the church the practice of appealing to visions in favour of opinions and actions, of which practice Cyprian and others availed themselves to a great extent. (Middleton's *Free Enquiry*, p. 98, &c.) Tertullian, who belonged to this sect, informs us that these revelations related only to points of discipline, and neither affected the doctrines of religion nor superseded the authority of Scripture. The doctrines of Montanus agreed in general with those of the Catholic church, but some of his followers appear to have embraced the Sabellian heresy. The Montanists were chiefly distinguished from other Christians by the austerity of their manners and the strictness of their discipline. They condemned second marriages, and practised fasts. They maintained that all flight from persecution was unlawful, and that the church had no power to forgive great sins committed after baptism. They held the doctrine of the personal reign of Christ on earth at the Millennium. They are accused by some of the early writers of celebrating mysteries attended by deeds of cruelty and lewdness, but it appears quite certain that these charges are unfounded.

The Montanists were warmly opposed by the writers of the Catholic party, though they were once countenanced for a short time by a bishop of Rome, whose name is unknown, but who is supposed by some to have been Victor. Tertullian wrote several works in defence of their opinions. [TERTULLIAN.]

The sect was numerous, and lasted a considerable time. They still existed in the time of Augustin and Jerome, the latter of whom wrote against them.

(Eusebius, *Hist. Ecc.*; Epiphanius, *De Hæresiis*; Tertullian's *Works*; Lardner's *History of Heretics*, chap. xix; Mosheim's *Ecc. Hist.*; Neander's *Kirchengeschichte*.)

MONTA'NUS, A'RIAS. [ARIAS MONTANUS.]

MONTARGIS. [LOIRET.]

MONTAUBAN, a town in the south of France, capital of the department of Tarn et Garonne, situated on the river Tarn just below the junction of the little river Tescou, in 44° 1′ N. lat. and 1° 21′ E. long.; 336 miles in a direct line south by west of Paris, or 408 miles by the road through Orléans, Châteauroux, Limoges, and Cahors.

The town was founded in A.D. 1144 by Count Alphonse of Toulouse. In the religious contests of the sixteenth century it was fortified by the Huguenot party, and resisted the attack of the Catholics, who besieged it under Monluc, A.D. 1580. In the following century, being still in the hands of the same party, it resisted the attack of Louis XIII., A.D. 1621, and did not submit until after the siege and capture of Rochelle, A.D. 1629. Its fortifications were soon after destroyed. It suffered much from the dragoonings of Louis XIV., but is still one of the chief seats of the reformed religion in France.

The town is in a pleasant situation, partly upon a gentle slope. It is a handsome place, and is considered healthy. The gates of the town are in general of an elegant architecture; the streets are well laid out and clean, and the houses, which are of brick, are in general well built. There is a handsome square in the centre of the town, with a piazza of two tiers of arches, ornamented with Doric pilasters. The centre of the square is laid out as a public garden. There are besides two handsome public walks, with a raised terrace between them, from which there is a fine view of the Pyrenees, distant 130 or 140 miles. There is a fine cathedral erected at a very early period. The other public buildings are worthy of notice, especially the town-hall and the bishop's palace. There is a bridge built of brick over the Tarn, which is here navigable, and runs through the town, dividing it into two parts. There are numerous villas round the town.

The population in 1831 was 18,255 for the town, or 25,460 for the whole commune; in 1836 it was 23,865 for the commune. There are a considerable number of manufactories of common woollen cloth, kerseymere, serge and other woollen goods, silk stockings and broad silks, starch, and cards for dressing woollen goods: there are also soap-houses, potteries, brandy distilleries, tan-yards, and dye-houses. It is a great mart for corn and for common woollens. There are five fairs in the year, three of which continue for eight days each. The navigation of the Tarn and the Garonne affords ready communication with Bordeaux. The town has a theatre, a public library of 10,000 volumes, baths, and excellent inns. The surrounding country abounds with excellent fruit, fish, poultry, and ortolans. The 'pâtés de foie gras' of this place are considered equal to those of Toulouse, and the wines of Montbartier, Fau, Aussas or Aussac, and Auviller, obtained from the vineyards round the neighbouring town of Castel-Sarrazin, are excellent. Literature is cultivated, and the town has produced some writers of considerable repute.

There are a subordinate court of justice, a commercial court, several fiscal or administrative government offices, and societies for the promotion or direction of manufactures and agriculture. There are a theological seminary for Protestants and a Protestant Auxiliary Bible Society; a society of agriculture, science, and the belles-lettres; a high-school, a free drawing-school, and a maternity society.

Montauban is the seat of a bishopric; the diocese comprehends the department of Tarn et Garonne. The bishop is a suffragan of the archbishop of Toulouse and Narbonne.

The arrondissement of Montauban has an area of 619 square miles, and comprehends 62 communes. It is subdivided into eleven cantons or districts, each under a justice of the peace. The population in 1831 was 107,853; in 1836 it was 106,799.

MONTBE'LIARD. [DOUBS.]

MONTBRISON. [LOIRE.]

MONTCALM, MARQUIS DE. [WOLFE, GENERAL.]

MONTDIDIER. [SOMME.]

MONTECASI'NO is the name of a celebrated monastery in the kingdom of Naples, in the province of Terra di Lavoro, near the borders of the Papal state. It is situated on the summit of a steep and lofty mountain, which is an offset of the Apennines, and which rises above the valley of the Frigido, an affluent of the Liris. The town of San

Germano, which is built at the foot of the mountain, partly occupies the site of the antient Casinum, a town of the Volsci, and subsequently a Roman colony, which was sacked by Hannibal's troops on their march from Capua towards Rome. Remains of the antient town are still seen, including an amphitheatre, a theatre, and several sepulchral monuments. It was in A.D. 528 that St. Benedict repaired to this spot, and began the foundation of this celebrated monastery, which afterwards became the head-quarters of his order. [BENEDICT, SAINT.] The monastery was destroyed by the Longobards about the year 582, was restored more than a century after, and became more magnificent than before, being enriched by gifts from various princes. Ratchis, king of the Longobards, as well as Carloman, brother of Pepin, king of the Franks, retired to Monte Casino, where they became monks, and died there. The monastery was again destroyed by the Saracens, A.D. 884, but was restored in the year 949. The age that followed was a period of the greatest splendour for the monastery: the abbot was a powerful feudal baron, who had jurisdiction over an extensive territory, and interfered in the quarrels of the neighbouring princes and of the Normans. The abbot Desiderius, afterwards pope Victor III., rebuilt the church of the monastery in the year 1066, and a numerous assembly of bishops assisted at its consecration. The bronze gates, which were wrought by his order about the same time at Constantinople, and which are still seen, exhibit in silver inlaid letters a list of all the tenures, castles, fiefs, and lands possessed by the abbey at that time. The abbots were elected by the monks till 1454, when the abbotship was bestowed in commendam on several cardinals in succession. The last commendatory or titular abbot was Giovanni de' Medici, afterwards Pope Leo X., after which the regular election of abbots was restored. The abbot was elected for six years, during which he was also bishop of San Germano and the adjacent district. He was first baron of the kingdom of Naples, enjoyed ample privileges, and went out generally in a coach and six. At the expiration of the six years, he returned to his former condition, but retained the privilege of wearing the cross, as a mark of his dignity, and he had precedence in great religious ceremonies.

The revenues of the abbey were 100,000 ducats, about 17,000*l.* sterling. With these the monks supported not only their own community, which consisted of about fifty professed members, besides lay brothers or servants, but also extensive accessory establishments, such as the hospice at the foot of the mountain, where sickly and aged monks were kept, and travellers and visitors were entertained, and a seminary in the town of San Germano attached to that episcopal see.

Among other literary men who visited, at various times, the monastery of Monte Casino, chiefly for the sake of its library, were Boccaccio, Poggio Bracciolini, and Mabillon, the accounts of whom may be referred to for the condition of that institution in their respective epochs. Swinburne and other travellers of the last century have given an account of Monte Casino as it was before the French revolution and invasion.

After the French occupied the kingdom of Naples in 1806, they suppressed all the wealthy convents, abolished among others the feudal rights of Monte Casino, and seized its landed property, but maintained the establishment, as well as those of Monte Vergine and La Cava, with a few monks in each to take care of the valuable archives and libraries of those institutions. King Ferdinand, after his restoration in 1815, gave back to the monastery of Monte Casino part of its former possessions. The monastery has now a revenue of 24,000 ducats, about 4,000*l.* sterling, and is inhabited by about 15 monks. The last account we have seen of Monte Casino is by the Hon. Keppel Craven, in his interesting 'Excursions in the Abruzzi and the Northern Provinces of Naples,' London, 1828, from which we derive the following description.

The vast structure, every side of which exhibits long rows of windows, covers the whole platform of the detached and conical mountain, the ground sloping from the base of the walls on all sides: some of the adjoining borders have been converted into enclosed grounds, and furnished with fruit-trees and timber of larger growth. The edifice is built of small stones, covered with a reddish-gray stucco, of a sober yet not dull hue. The road to the monastery winds in a zig-zag up the mountain, and gives access to the building through an archway cut in the rock and a double gate leading into a large court, followed by two other courts of equal dimensions, communicating with each other by open arcades. The middle court is provided with a large cistern, and from one of its extremities a handsome flight of steps ascends to the quadrangle before the church, which stands on a much higher level. The quadrangle is enclosed by cloisters, the arches of which are supported by fine granite columns, brought from the ruins of Casinum. Marble statues of the principal benefactors of the community are placed in niches in the wall of the cloisters. The church is very handsome, rich in marbles, and is ornamented with several interesting sepulchral monuments; amongst others, that of Piero de' Medici, the son of Lorenzo the Magnificent, who was drowned in the Liris after the defeat of the French, in whose army he served, by Gonzalo of Cordova, in 1503. The ceiling and lateral chapels are painted by Luca Giordano and other Neapolitan and Sicilian painters. The organ is one of the finest in Italy. The seats in the choir are of walnut and oak wood, richly carved. The church is kept remarkably clean, and in this respect it reminds the traveller of St. Peter's at Rome. The rest of the monastery is grand and imposing, but not magnificent, being distributed internally in a style of simplicity which corresponds with the original institutions of the order. The contrast between the modest dimensions of the cells of the individual monks and the magnificent distribution of the public or communal part of the building, such as the courts, porticoes, church, chapter, and refectory, is characteristic of the old spirit of monastic institutions, in which the community was everything and the individual nothing.

The library of Monte Casino, which is now kept in very good order, contains 18,000 volumes, among which are some rare editions of the fifteenth century. The archives contain a valuable collection of original charters, diplomas, grants, &c., of emperors, kings, and Longobard dukes, as well as papal bulls; many of the charters belong to the ninth century, and some MSS. to the sixth century; a curious letter of Mahomet II. to Pope Nicholas V., with the answer of the latter; a collection of autograph letters of Mabillon, Montfaucon, Muratori, and other learned philologists. (Valéry, *Voyages en Italie.*) There is also a small collection of antiquities, inscriptions, and a chair of 'rosso antico,' of exquisite workmanship, which was found in the neighbourhood.

MONTECUCULI, RAYMOND, COUNT DE, Prince of Melfi, Knight of the Golden Fleece, and Generalissimo of the Imperial armies, was born at Modena in 1608, of a noble family of that duchy. Following the example of some of its members, he entered the service of the house of Austria in the Thirty Years' War; and after bearing arms as a simple volunteer under one of his uncles, and rising through the usual gradations of rank, he first signalized his military talents at the head of two thousand horse, by surprising and cutting to pieces a body of ten thousand Swedes, who were engaged in the siege of Numslau, in Silesia. But he soon after experienced the inconstancy of fortune, being himself defeated and made prisoner, in 1639, by the Swedes under the celebrated Bannier, near Prague. He is said to have beguiled the two years of his captivity in cultivating the taste for letters which he subsequently evinced; and, after his release, he resumed his service, with increasing reputation, in the defence of Silesia and Bavaria, and in the defeat of the Swedes under Wrangel at Triebel, in 1647; until the termination of hostilities, by the peace of Westphalia in the following year, enabled him to revisit his native duchy. There, at the marriage festivities of the duke Francesco I., he had the misfortune to kill one of his dearest friends, Count Manzani, in a tournament; perhaps the latest recorded catastrophe which attended the dangerous games of chivalry.

In 1657 Montecuculi was sent by the emperor to assist John Casimir, king of Poland, against Ragotski, prince of Transylvania, and the Swedes, whom he drove out of Poland, and compelled to conclude a peace. He was subsequently employed in Hungary in the war, of which he has himself given a relation in his memoirs, between the Imperialists and the Turks; and in 1664, he gained so decisive a victory over the latter at St. Gothard as to compel them to sue for a truce of twenty years.

In 1673 he reached the climax of his fame by being opposed to the illustrious Turenne, in the war between the empire and France on the Rhenish frontier. The nicely

balanced operations of these two great generals, who, without committing the event to a battle, displayed more science in marches and encampments than other commanders have exhibited in a whole series of victories, were the admiration of their contemporaries; and when the fall of Turenne by a chance shot, in 1675, gave free scope to the genius of his opponent, Louis XIV. could find no one but the great Condé competent to arrest the progress of Montecuculi. Another most able though indecisive campaign closed the services both of Condé and Montecuculi: the latter of whom, claiming no victory, deemed it his highest honour to have encountered without defeat the two greatest French generals of their century. The remaining few years of his life were passed in peace at the Imperial court, and he died in 1680.

As a general, Montecuculi was accused of excessive caution and want of enterprise, qualities which he himself held to be no reproach. He had profoundly studied the art of war; and the memoirs which he composed upon its general principles and practice, as well as upon the peculiarities of warfare against the Turks, and on the operations of the Turkish war of 1661-1664, still retain their value, not only as the most interesting and instructive records of the martial establishments and service of his times, but for the soundness of the maxims which they contain, applicable to all ages of the military art. He was a zealous and generous patron of letters, as well as a great strategist; and to him principally the Academy of Naturalists at Vienna owes its establishment.

A good French translation of the *Memoirs of Montecuculi* was published at Amsterdam, in 1752, with a 'Life of the Author' prefixed.

MONTE'GO BAY. [JAMAICA.]

MONTE'LIMAR, or MONTE'LIMART, a town in France, capital of an arrondissement in the department of Drôme, situated at the junction of the Jabrou and the Roubion, two small streams which flow into the Rhône a little below the town, in 44° 33′ N. lat. and 4° 44° E. long., 381 miles from Paris by Sens, Auxerre, Lyon, Vienne, and Valence.

The Itinerary from Burdigala to Hierosolyma (Bordeaux to Jerusalem), and the Theodosian or Peutinger Table, mention a place, Acunum, on the road between Valentia (Valence) and Arausio (Orange); and Ptolemy mentions a Roman colony, Acusio, in the country of the Cavares. These two places are considered as identical, and some geographers fix them on the site of Montélimar; but D'Anville prefers to fix them at Aucone, a village near Montélimar, on the bank of the Rhône. It is at any rate probable that Montélimar rose on the decay of the Roman town. In the religious wars of the sixteenth century it was taken by the Huguenots, who had a considerable party in the town (A.D. 1567), and retaken by the Catholics; but it was not till the reign of Henri IV. that internal peace was restored.

The town is delightfully situated in the midst of hills, covered with vines and mulberry and other fruit trees. It is surrounded by walls, which have boulevards within and without. The town gates face the four cardinal points. The ruins of an antient citadel command the place. Several canals traverse the town, and the road from Lyon to Marseille runs through the best built and pleasantest quarter. There is a stone bridge over the united streams of the Roubion and the Jabrou.

The population in 1831 was 5816 for the town, or 7560 for the whole commune; in 1836 it was 7966 for the commune.

There are silk-throwing mills; linens, wicker-wares, and excellent morocco, chamois, and other leather, are manufactured. Trade is carried on in walnut-oil, wax, honey, silk, corn, hay, wine, &c. The meadows round the town are irrigated with considerable skill; and there are lime-kilns and tile-kilns. Many silkworms are bred. Truffles of middling quality are found, and there is a tolerably copious medicinal spring. Faujas de St. Fond, the geologist, was a native of Montélimart.

There are a subordinate court of justice, one or two fiscal government offices, and a high school; a public library of 3000 volumes, and a collection of chemical and philosophical apparatus.

The arrondissement has an area of 436 square miles, and comprehends 68 communes. It is subdivided into five cantons, or districts, each under a justice of the peace. The population in 1831 was 62,530; in 1836 it was 64,612.

MONTEM CUSTOM, the antient custom of a procession of the scholars of Eton school in Buckinghamshire *ad montem*. It is made every third year on Whit-Tuesday, to a tumulus near the Bath road, which has acquired the name of Salt-hill, by which also the neighbouring inns have been long known. The chief object of the celebration is to collect money for *salt*, as the phrase is, from all persons present, and it is exacted even from passengers travelling the road. The scholars who collect the money are called salt-bearers, and are dressed in rich silk habits. Tickets inscribed with some motto, such as *Ad Montem*, *Mos pro Lege*, or *Pro More et Monte*, by way of pass-word, are given to such persons as have already paid for *salt*, as a security from any further demands.

This ceremony has been frequently honoured with the presence of the king and queen, and the royal family, whose liberal contributions, added to those of many of the nobility, and others, who have been educated at Eton, have so far augmented the general collection, that it has been known to amount to near 1000*l*. The sum so collected is given to the senior scholar, who is going off to Cambridge, for his support at the university. It would be in vain perhaps to trace the origin of all the circumstances of this singular custom, particularly that of collecting money for *salt*, which has been in use from time immemorial. The procession itself seems to be coeval with the foundation of the college, and it has been conjectured with much probability that it was that of the *Bairn*, or *Boy-bishop*. It originally took place on the 6th of December, the festival of St. Nicholas, the patron of children, being the day on which it was customary at Salisbury, and in other places where the ceremony was observed, to elect the Boy-bishop from among the children belonging to the cathedral. It is only since 1759 that the time of the celebration of the Eton Montem has been changed. It was formerly a part of the ceremony that a boy dressed in a clerical habit, with a wig, should read prayers.

(Huggett's *M.S. Collections for a History of Windsor and Eton Colleges*, in the British Museum; Lysons's *Magna Britannica*, vol. i., p. 558; Brand's *Popular Antiquities*, 4to edit., vol. i., p. 337-349.)

MONTENEGRINS. [MONTENERO.]

MONTENE'RO, 'the black mountain,' so called on account of the dark forests which cover its sides, is the name given by the Venetians, and adopted by European geographers, to a mountainous district forming part of the high land of Albania, and situated on the borders of Herzegovina, and of the former Venetian and now Austrian territory of Cattaro. An offset of the chain which bounds Albania to the north, the Mounts Bertiscus and Scardus of the antients, runs in a southern direction between the sources of the Narenta and the Moroka, and forms the boundary between the Turkish provinces of Albania and Herzegovina. On reaching the innermost recess of the deep gulf of Cattaro, north-east of the town of Perasto, this ridge divides into two branches, one to the north west and the other to the south-east, both of which advance to the coast of the Adriatic Sea, and encircle between them the basin of the gulf of Cattaro with its several bays and the territory around, which constitutes the Austrian districts of Castelnuovo, Risano, Perasto, Cattaro, Budua, and Pastrovich. To the east of the main ridge, and north-east of the Austrian territory, lies the district of Montenero, consisting of several high valleys sloping to the south-east, the waters of which flow into Turkish Albania by two streams, the Schiniza and the Ricovcernovich, both affluents of the lake of Scutari. The length of this mountainous and little known district is reckoned at about twenty-five miles from north to south, and about eighteen in its greatest breadth from east to west: it is said to contain about 60,000 inhabitants, a fierce race, which has always maintained its independence against the Turks. The following are the principal valleys of Montenero:—1. Katunzka Nahia, the widest and most central, is watered by the Ricovcernovich, and contains the capital, Cettigne, with a convent, the residence of the Greek bishop, and the villages of Gnegusi, Xagneudo, and others. Mount Bukovizza rises above this valley in the centre of Montenero. 2. Liesanska Nahia, which runs north of and parallel to the preceding, contains the village of Dobro and some hamlets. 3. Czerniska Nahia, the southernmost district of Montenero, a long narrow valley between the Austrian territory on the west, from which it is divided by mounts Giurgevo, Ortich, and Resevich, and Turkish Albania on the east, from which it is separated by another ridge, contains

several villages, Ocinichi, Optocichi, Dobraceli, &c. (*Carte des Bouches de Cattaro et de Montenero*, by Max. de Traux, an Austrian engineer, Vienna, 1808.)

The inhabitants of Montenero, or Montenegrins, are a Sclavonian race, and speak a dialect of the Sclavonian. They call their country Czerna Gora. They belong to the Eastern church, and are governed by their Wladika, or bishop, assisted by a council of the chief families. All the men are armed, and extremely jealous of their independence. Their country is not very fertile; it produces fruits, but little corn, and has good pasturage for cattle, and much timber. The Montenegrins are given to plunder, and they now and then make predatory incursions into the Turkish territory. In the wars of Venice with the Turks they acted as auxiliaries, though at times troublesome ones, of the former power.

In 1767 an adventurer made his appearance among them, who gave himself out for Peter III., emperor of Russia, and created considerable disturbance for a time. After the fall of Venice in 1797, Cattaro was given up to Austria. By the treaty of Presburg in 1805 it was ceded to France; but before the French garrison could reach that district, the natives, joined to the Montenegrins, excited by a Russian agent, rose in arms and occupied Cattaro, Castelnuovo, and the other towns. This served to the French as a pretext for taking forcible possession of the neighbouring republic of Ragusa. But the Montenegrins came down from the mountains, and besieged General Lauriston within the town of Ragusa. A desperate war ensued between the Montenegrins and the French commanded by Marmont, Lauriston, and Molitor, in which no quarter was given; until the French at last took possession of Cattaro, and drove the Montenegrins back to their mountains. (Botta, *Storia d'Italia*, b. 22.)

Since 1814 the Montenegrins are nominally under the protection of Austria, to whom they are occasionally a source of trouble, on account of their incursions into the Turkish territory, and the consequent complaints of the Turkish authorities. A French traveller, Sommieres, has written a *Voyage Historique et Politique à Montenero*, 2 vols. 1820.

MONTEREAU. [SEINE ET MARNE.]

MONTEREY. [MEXICAN STATES.]

MONTESQUIEU, CHARLES DE SECONDAT, BARON DE LA BRE'DE ET DE, was born on the 18th of January, 1689, at the Château de la Brède, in the immediate neighbourhood of Bordeaux. He was descended from a noble and otherwise distinguished family of the province of Guienne. His grandfather had filled the post of *président à mortier* in the parliament of Bordeaux, a post which Montesquieu himself afterwards filled. His father entered the same service, but quitted it early. The nobility which Montesquieu inherited was conferred upon his great-grandfather by Henry IV.

Montesquieu gave in youth the promise of his future fame. His habits were most studious, and his desire for learning was encouraged in every way by a fond and judicious father. At the time that he was engaged in a most laborious study of the civil law, with a view to the profession for which he was destined, he was also preparing a work on a theological subject, namely, 'Whether the idolatry which prevailed among the heathens deserved eternal damnation?' He attained the rank of *conseiller* in the parliament of Bordeaux in 1714, and three years afterwards, on the death of a paternal uncle, he succeeded at the same time to his fortune and to his post of *président à mortier* in the same parliament. With the most assiduous and conscientious discharge of his duties as a judge, he united the pursuit of literature. In 1716 he had become a member of the Academy of Bordeaux, and he was very zealous in endeavouring to direct the attention of this body more to physical science. He seems at this time to have been very much impressed with the importance of physical science, which he afterwards neglected altogether for the pursuit of moral science. About this time he wrote his 'Physical History of the Antient and Modern World,' which was published in 1719. He shortly returned however, and allowed the Academy likewise to return, to literature; and he now wrote several small essays on literary subjects, which were read at meetings of the Academy. In 1721 appeared the work which first brought him fame, the 'Lettres Persanes,' which was published anonymously, but the author soon became known. The popularity of these letters was so great, that, as Montesquieu says in a preface to a later edition, 'Book sellers used to go about the street, catching every one by the sleeve, and begging, "Pry'thee, write for me some Persian Letters."'

His classical romance, called 'Le Temple du Gnide,' was published in 1725. In the course of the next year Montesquieu formed the resolution of retiring from his judicial duties, and of devoting himself entirely to literature. He accordingly sold his presidentship. A vacancy occurring shortly after in the French Academy, on the death of M. de Sacy, Montesquieu became a candidate for the vacant place. His principal claim to the distinction was derived from the 'Lettres Persanes,' but these seemed likely for a time to be the chief obstacle to his success. Notwithstanding their general popularity, an outcry had been raised against them by many on the ground of irreligious tendency; and the Cardinal de Fleury, the chief minister, now wrote to tell the president of the Academy that the king would refuse his consent to the election of the author of so irreligious a work as the 'Lettres Persanes.' The course taken by Montesquieu for the purpose of overcoming the royal opposition does not seem to have been the most straightforward and manly. He immediately published, according to Voltaire, a new edition of the 'Lettres,' in which the passages objected to were omitted or softened; and having carried this edition to the minister, and having disavowed all the obnoxious passages of the earlier editions, he succeeded in changing the king's resolution. (*Ecrivains Français du Siècle de Louis XIV.*)

D'Alembert gives a somewhat different account: but inasmuch as this appears in an *éloge*, it is to be received with suspicion. There seems indeed to be no authority for the statement which D'Alembert makes, and which is indeed unnecessary if the contents of the book were such as the minister could approve of, that several letters by another hand were inserted by the printer of the book. The writer of the life of Montesquieu, in the 'Biographie Universelle,' rejects D'Alembert's account, and, admitting that Montesquieu disavowed the obnoxious passages of his work when they were likely to stand in the way of his ambition, attempts to justify him on the ground that the work had been published anonymously; that he had never since put his name to it, and that there was in consequence no fraud in disavowing that of which he had never acknowledged the authorship.

The result however was that Montesquieu gained the support of the minister, and was elected a member of the Academy. He shortly after set out on an extensive course of travels. He went first to Vienna, where he had much intercourse with the celebrated Prince Eugene; then travelled through Hungary and Italy, staying for some time at Venice, at Rome, and at Genoa. He next travelled through Germany into Holland, and thence, in company with lord Chesterfield, he came to England. In England he stayed two years, receiving great attentions from the great, whether by rank or by reputation, and collecting materials, as he had done also in the other countries which he had visited, for his great work.

On his return to France he spent two years in studious retirement in the country. He published in 1734 his work on the causes of the 'Greatness and Decline of the Romans:' and immediately after its publication he set to work to prepare the 'Esprit des Lois.' He was engaged upon this for fourteen years; and he tells us that very often, frightened with the greatness of his task, he was disposed to abandon it. When at last it was completed, he submitted it to the judgment of his friend Helvetius, who, by reason principally of its desultory unconnected character, strongly dissuaded him from publication. But whatever misgivings Montesquieu may have had while the work was in progress, were now entirely removed; and undeterred by the remonstrances of Helvetius, he published, and he had his reward in an almost universal admiration. Montesquieu did not very long survive the publication. He died in February, 1755, after a short but severe illness.

The personal character of Montesquieu was in every respect excellent. He had married at the age of twenty-six, and his family consisted of a son and two daughters. Through life he practised a rigid economy, on the principle, as we are told by M. d'Alembert, that he ought to transmit his patrimony unimpaired to his children; but he took care that his economy should not stand in the way of charity. In the intercourse of society Montesquieu appears to have been agreeable without being brilliant.

The writings of Montesquieu show much variety of talent. Even if the 'Esprit des Lois' had not been written, the author of the 'Lettres Persanes,' remarkable for their refined humour, and of the 'Temple du Gnide,' an exquisite little romance, could not have been forgotten. And without disparaging at all the merits of Montesquieu's great and best known work, it may be said that these smaller productions are much more perfect in their kind than is the 'Esprit des Lois' as a treatise on political science. The chief merits of this work are its agreeable style, its various knowledge, its ingenious and at the same time sensible mode of treating the art of government, and its enlightened advocacy of what, not very definitely or correctly, are called the principles of civil liberty. The last-mentioned merit is greater on account of the time at which the work appeared. The defects of the work, on the other hand, are want of system, shallowness, not so much of knowledge as of thought, and (what is at once a sign and a consequence of this shallowness) an undue exaltation of experience over principles. The time again at which the work appeared will serve in the way of extenuation of these defects; and it is to be remembered also that the plan of the work is professedly inductive rather than scientific.

The 'Esprit des Lois' has given occasion to a work by M. Destutt de Tracy, which, though partaking in some degree of the vagueness of Montesquieu's work, is very valuable both in itself and as a commentary on the 'Esprit des Lois.' Its title is 'Commentaire sur l'Esprit des Lois.'

MONTEVIDEO, or S. FELIPE DE MONTEVIDEO, is the capital of the republic of Uraguay, or Banda Oriental, in South America. It is situated in 34° 55′ S. lat. and 56° 10′ W. long., and built on a small promontory, which forms the eastern shore of its harbour, the western consisting of another projecting point connected with a hill, from which the town has received its name. It is 130 miles from Cape S. Mary, which forms the northern point of the entrance of the La Plata river, and opposite the town the river is still 70 miles wide. Its harbour is more than 4 miles long and more than 2 miles wide, but too shallow for large vessels; it is also exposed to the *pamperos*, or south-western winds, which blow over the extensive plains called *pampas* with exceedingly great force. With all these disadvantages, it is the best harbour on the broad æstuary of the La Plata river. The town is in general well built, the streets being wide, straight, and intersecting each other at right angles: they are paved, and have narrow footways. The houses are built with taste, and have flat roofs and parapets. The cathedral, dedicated to the apostles S. Felipe and S. Jago, is not distinguished by its architecture, nor are there any other public buildings of note. Montevideo is a very healthy place, but suffers from want of wood and water. The inhabitants use rain-water, which is collected in cisterns placed in the court-yard of each house; but there are also some wells dug near the sea-shore, from which water is brought in carts for the supply of the town. The population, which, before 1810, is stated to have amounted to 30,000 or even 36,000 souls, was reduced by war and a siege, which the town had to sustain against the Brazilians, to 15,000 souls; but it has probably again increased during the last ten years. Its commerce is increasing. The principal articles of export are the produce of the numerous herds of the country, as hides, salted and jerked beef, tallow, and horns, to a very considerable amount.

(Henderson's *History of Brazil;* and Brackenridge's *Voyage to South America.*)

MONTEZU'MA. [MEXICO.]

MONTFAUCON, BERNARD DE, a Benedictine of the congregation of St. Maur, and a very learned antiquary, was born January 17th, 1655, at Soulage in Languedoc. He was the son of Timoleon de Montfaucon, lord of Roquetaillade and Conillac, and was the second of four brothers. He has himself preserved, in his 'Bibliotheca Bibliothecarum MSS.,' the pedigree of his family, which was originally from Gascony. His early studies were conducted first in his father's castle at Roquetaillade, and afterwards among the religious at Limoux. His first profession in life was military, and he served in one or two campaigns in Germany under marshal Turenne. The death of his parents however, and of an officer of distinction under whom he had fought, induced him, after two years, to change his plan of life, and at the age of twenty; in 1675, he entered the congregation of St. Maur. In this learned Society he had every opportunity to improve his early education.

His first work was a supplement to Cotelerius, entitled 'Analecta Græca,' 4to., Paris, 1688, with notes by him and the fathers Anthony Pouget and James Lopin. In 1690 he published a small volume entitled 'La Verité de l'Histoire de Judith,' 12mo. His next important work was a new edition of St. Athanasius, in Greek and Latin, 3 vols. folio, a labour which established his reputation as a profound scholar.

In the same year Montfaucon, who had turned his thoughts to more extensive collections of antiquities than had then appeared, determined to visit Italy for the purpose of consulting the manuscripts in the Italian libraries. In this pursuit he passed three years, and upon his return in 1702, published an account of his journey and researches in his 'Diarium Italicum.'

During Montfaucon's residence at Rome he held the office of procurator-general of his congregation at that court; and while there, in 1699, published a little volume in vindication of the Benedictine edition of the works of St. Augustin, in 11 vols. fol., the publication of which had been begun by some able men of his Order, at Antwerp, in 1679, and was not completed till 1700. In 1706 Montfaucon published, in 2 vols. fol., a collection of the antient Greek ecclesiastical writers, with a Latin translation, notes, dissertations, &c., and in 1708 his 'Palæographia Græca.' In 1709 he published 'Philo-Judæus on a Contemplative Life,' in French, 'Le Livre de Philon de la Vie Contemplative,' &c., translated from the Greek, with notes, and an attempt to prove that the Therapeutæ of whom Philo speaks were Christians; and in 1710 an 'Epistola' on the fact mentioned by Rufinus that St. Athanasius baptised children when himself a child. This was followed in 1713 by an edition of what remains of the 'Hexapla' of Origen, 2 vols. fol., and an edition of the works of St. Chrysostom, begun in 1718, and completed in 1738, 13 vols. fol.

In 1715 he published his 'Bibliotheca Cosliniana,' fol., Paris; and in 1719, the year in which he was chosen a member of the Academy of Inscriptions and Belles-Lettres, his great work, entitled 'L'Antiquité Expliquée et Représentée en Figures,' Paris, 5 vols. fol., to which, in 1724, was added a Supplement in 5 vols. This was followed by another interesting work, 'Les Monumens de la Monarchie Françoise,' 5 vols. fol., Paris, 1729-1733. His last and not the least important of his works was his 'Bibliotheca Bibliothecarum MSS. nova,' 2 vols. fol., Paris, 1739. Montfaucon died suddenly at the abbey of St. Germain de Pres, December 21, 1741, at the advanced age of eighty-seven. Besides the works already enumerated, he contributed many curious and valuable essays on subjects of antiquity to the Memoirs of the Academy of Inscriptions and Belles-Lettres, as well as to other literary journals. (Moreri, *Dict. Hist.;* Chalmers's *Biogr. Dict.*, vol. xxii., p. 298-303.)

MONTFERRAND. [CLERMONT.]

MONTFLANQUIN. [LOT ET GARONNE.]

MONTFORT. [ILLE ET VILAINE; SEINE ET OISE.]

MONTFORT, SIMON DE. [HENRY III.]

MONTGOLFIER. [BALLOON.]

MONTGOMERY. [MONTGOMERYSHIRE.]

MONTGOMERYSHIRE, a county of North Wales, bounded on the north by Denbighshire, on the east and south-east by Shropshire, on the south by Radnorshire, on the south-west by Cardiganshire, and on the west and north-west by Merionethshire. Its form is compact, and approximates to that of an oblong quadrangle, having its sides respectively facing the north-east, north-west, south-east, and south-west: the length of the quadrangle from north-east to south-west varies from 23 to 40 miles; the breadth from 19 to 33 miles. The area of the county is estimated at 839 square miles; it is the second of the Welsh counties in extent, being inferior only to Caermarthenshire (974 square miles). The population, in 1831, was 66,482, which gives 79 inhabitants to a square mile. In amount of population it is the fifth of the Welsh counties, being inferior to Pembrokeshire, but superior to Caernarvonshire; in density of population it is the ninth, being inferior to Cardiganshire, but exceeding Brecknockshire. Montgomery, which gives name to the county, is 150 miles from London, in a direct line north-west; 168 miles by the road through Worcester, Tenbury, Ludlow, and Bishop's Castle; or 174 miles by Birmingham and Shrewsbury.

Surface and Geology.—Montgomeryshire is entirely an inland county, and belongs wholly to the mountainous tract of Wales. The north-western border toward Merioneth-

shire is occupied by the Berwyn Mountains, and when these form two branches enclosing the valley of the Dovey, the south-eastern branch belongs in great degree to Montgomeryshire. It separates the basin of the Dovey from that of the Severn.

The south-eastern border is occupied by the heights which extend from the neighbourhood of Shrewsbury across Clun Forest to Rhayader in Radnorshire. Irregular branches from these two principal chains occupy the intermediate part of the county, and are separated by narrow valleys watered by the various streams that flow into the Severn, to the basin of which the whole county belongs, except that part which is enclosed between the two branches of the Berwyn chain, and which belongs to the basin of the Dovey. The principal peaks are Cefn Ucha, Craig Mwyn, Moel Angel, Bwlch y-Fedwyn, Mynydd Cemmes, and Moel Fre, in the Berwyn chain; and the Breiddin hills (Moel Golpha, Moel Fammau, and Cefn Cistyll) about 1200 feet high; Long Mountain, 1330 feet; Kerry Hill, and Llandinam Mountain, 1895 feet high, in the chain that skirts the Shropshire and Radnorshire border. Plinlimmon belongs to the Berwyn chain, and is partly in this county, but its summit (2463 feet) is just within the border of Cardiganshire.

The county is almost entirely occupied by the slate rocks which overspread so large a portion of Wales. The principal exceptions are the Breiddin hills, which are composed of rocks of very varied character, granite, greenstone, and conglomerate; and a small tract at the eastern angle of the county, near the junction of the Severn and the Vyrnwy, where the new red-sandstone, or red marl of Cheshire and Shropshire, is found. The mineral treasures are not very abundant. Lead and zinc are procured from mines near Llangynog or Llangynnog, in the hills that bound the valley of the Tanad or Tanat; lead in the Berwyn mountains near Plinlimmon, and copper and zinc between Llanfyllin and Oswestry, on the Shropshire border. Millstones are quarried in the Breiddin hills; stone for other purposes, in the neighbourhood of Plinlimmon; slates of rather inferior quality at Llangyniog in the vale of the Tanat, at Llanwddyn in the vale of the Vyrnwy, in the hills near Llanidloes, and at Machynlleth; and a little coal and limestone near the border of Shropshire.

Hydrography, Communications, &c.—The Severn is the principal river of the county; it rises just within the border towards Cardiganshire, on the eastern side of Plinlimmon, and flows east about twelve miles to Llanidloes, receiving at that town the Clywedog, a river of about the same length as the Severn itself, and a number of small brooks. From Llanidloes the Severn flows north-east in a winding channel about thirty-eight miles, past Newtown and Welsh Pool, to the junction of the Vyrnwy on the border of the county towards Shropshire. A little below the junction of the Vyrnwy the Severn quits the border to enter Shropshire.

Between eight and nine miles below Llanidloes it receives the Tirannon, eleven or twelve miles long, and the Afon Garno, of about the same length; about nine miles lower down it receives the Mule, eleven miles long; and about five miles lower still the Rhiw, which is seventeen or eighteen miles long, and the Camlet, about twenty miles long; this last rises in Shropshire near the hill called Stiper Stones, six miles west-north-west of Church Stretton. All these streams, except the Mule and the Camlet, join the Severn on the left bank. That part of the course of the Severn which lies in Montgomeryshire or on the border may be estimated at fifty-one miles.

The Vyrnwy rises on the border near Bwlch-y-Pawl, and receives a number of small streams, as the Eunant, the Afon Gedig, the Afon Gynnan, the Glasgwm, and the Cowni; it flows south-east in a winding channel twenty-two miles to the junction of the Twrch, twenty-one miles long, which receives the Branwy and other small streams, and passes Llanfair. From the junction of the Twrch the Vyrnwy flows nine miles till it receives the Cain, eleven or twelve miles long, from above Llanyllin; and about a mile lower down the Tanat. The Twrch joins it on the right, the Cain and the Tanat on the left bank. The Tanat rises near Trim-y-Sarn on the Merionethshire border, and flows east-south-east into the Vyrnwy, chiefly in Montgomeryshire, partly on the Denbighshire border, and for two or three miles in Shropshire; it receives the Rhaiadr, the Afon Farrog in Montgomeryshire, and the Ymrch on the border of Montgomeryshire and Denbighshire. From the junction of the Tanat the Vyrnwy flows about 9 miles further to its junction with the Severn; its whole course is about 45 miles.

The southern part of the county is watered by the Wye, an important tributary of the Severn, which rises on the south-east side of Plinlimmon near the source of the Severn, and flows south-east thirteen or fourteen miles into Radnorshire, receiving by the way the Tarrenig, the Bidno, and the Nant-y-Durrel.

The Dovey chiefly belongs to Merionethshire. [MERIONETHSHIRE.] It enters Montgomeryshire about four miles below Dinas-y-Mowddy, and flows about nine or ten miles to the neighbourhood of Machynlleth, where it again touches Merionethshire. Its remaining course is between Merioneth shire on the north-west, and Montgomeryshire and Cardiganshire on the south-east. Of its tributaries the Tafalog and the Cwmcelli partially, and the Afon Yale, the Crewy, and the Dulas entirely, belong to this county. The Lyfn Nant, another feeder, separates Montgomeryshire from Cardiganshire. The Dulas has its source in the Glas Llyn, a small lake not a mile in extent in any direction, but yet the largest in the county.

Of these rivers only the Severn and the Dovey are navigable in that part which belongs to this county. The navigation of the Severn begins at Welsh Pool; that of the Dovey in the neighbourhood of Machynlleth: the length of the Severn navigation in or upon the border of this county is about eleven miles; that of the Dovey five or six miles.

The only navigable canal is the Montgomeryshire canal, which was commenced under an act obtained A.D. 1794. It commences in the Severn at Newtown, and runs along the valley of that river past Welsh Pool, about four miles below which it quits the immediate neighbourhood of the Severn, and runs northward to Llanymynech and Llanyblod will in Shropshire, where it joins a branch of the Ellesmere canal. Its whole length is twenty-seven miles, almost entirely in this county; it has a short branch below Welsh Pool to Guilsfield.

The principal roads which pass through this county are those from London by Shrewsbury to Caernarvon, Barmouth, Towyn, and Aberystwith. The road to Caernarvon crosses the north-eastern side of the county near the Denbighshire border, through Llanfyllin and Llangynnog to Bala in Merionethshire. The Barmouth road passes through the centre of the county by Welsh Pool and Llanfair to Dinas-y-Mowddy in Merionethshire: that to Towyn branches from the Barmouth road between Welsh Pool and Llanfair, and runs through Llanbrinmaer and Machynlleth. The Aberystwith road passes through Montgomery and along the valley of the Severn by Newtown and Llanidloes to Llangerrig, and from thence by the valley of the Wye into Cardiganshire. Another road from London to Aberystwith passes through Ludlow and Bishop's Castle to Newtown, where it joins the road just described. A road from Bishop's Castle runs by Montgomery to Welsh Pool; and another runs from Newtown to Llanbrinmaer and Towyn.

Divisions, Towns, &c.—Montgomeryshire takes its name from the town and castle of Montgomery, founded by Baldwin, lieutenant of the Marches to William the Conqueror and William Rufus, and recaptured probably from the Welsh by Roger de Montgomery, earl of Shrewsbury, who gave both to town and castle his own name. The Welsh call the town, from the name of its original founder, Tre Faldwyn, and the county Sir Tre Faldwyn. The county was formed in the reign of Henry VIII. It is divided into nine hundreds, as follows:

Name.	Position.	Pop. in 1831
Llanfyllin	N.	6,849
Deuddwr or Deythur	N.E.	2,417
Pool	N.E.	9,057
Cawrso	E.	2,712
Mathrafal	Central & N.W.	5,899
Machynlleth	W.	7,927
Llanidloes	S.	12,159
Montgomery	S.E.	5,532
Newtown	Central	13,930
		66,482

It contains the borough and market towns of Montgomery and Machynlleth, at one or other of which the county-court and court of election for the county members are held; Newtown and Welsh Pool, at which the assizes are now held in turn; Llanidloes and Llanfyllin; and the market-town of Llanfair.

Montgomery is in the hundred of Montgomery, 168 miles from London by Ludlow, or 174 by Shrewsbury. Baldwin or Baldwyn, who had been appointed lieutenant of the Marches by William the Conqueror, built a castle or other military post here, and laid the foundations of the town (A.D. 1092). Both appear to have been almost immediately captured by the Welsh, from whom they were taken again (A.D. 1093) by Roger de Montgomery, earl of Arundel and Shrewsbury. The earl fortified the place and called it after his own name; but in 1094 it was taken by the Welsh, who put the garrison to the sword, and ravaged this part of the border-land. William Rufus assembled an army, repulsed them, and strengthened and provisioned the castle of Montgomery. It was however again taken and utterly destroyed by the Welsh; but after a severe contest the Norman power prevailed, the Welsh were driven to their fastnesses, and the earl of Shrewsbury rebuilt the castle. This however appears to have shared the fate of its predecessor, for Henry III. built a new castle here, A.D. 1221, which was, ten years afterwards, taken and burned by Llewelyn, prince of North Wales. Montgomery afterwards formed part of the possessions of the Mortimer family. In the civil war of Charles I. the castle was fortified for the king; but it was given up by the governor to the Parliamentarians, and was shortly afterwards besieged by the Royalists. The advance of a body of 3000 Parliamentary troops to its relief led to a desperate encounter, in which the Royalists (5000 strong) were defeated, with the loss of 500 slain and 1400 prisoners. The castle was afterwards dismantled by the order of the House of Commons.

The town is partly on the slope and partly on the summit of a hill, which is commanded by a much loftier elevation in the immediate neighbourhood. It is a small place, consisting of four principal streets, which meet in the market-place in the centre of the town. The houses are well built and of respectable appearance, and the town is the residence of several persons of small independence, to whom its quiet situation and delightful environs, and the cheapness of living, render it attractive. It is not on any great thoroughfare, and has little trade or manufacture. There is a weekly market on Thursday, well supplied with corn and provisions of all kinds. There are several yearly fairs. The population of the parish in 1831 was 1188, about one-third agricultural.

The castle stood on a steep projecting eminence on the north side of the town. The remains consist of a fragment of a tower at the south-west angle and some portions of the walls: between the buildings and the precipitous side of the hill above the town is a level space, probably used as a parade for the garrison. This castle appears to have been defended by four ditches cut in the solid rock, and crossed by drawbridges. The town itself was also defended by walls flanked with towers and secured by four gates; but of these defences there appear to be no other remains than a few trifling fragments of the wall. At the foot of the castle-hill are traces of a small fort, conjectured to be the original Norman castle erected by Baldwyn; and on a neighbouring hill, intersected in the only accessible parts by deep ditches, are the remains of an extensive British camp, from which is a fine view of the vale of Montgomery. The church is an antient cruciform building, not very large, in the early English style, with a tower erected in the course of the present century. There are some interesting monuments in the church. The town-hall is a brick building, with a market-house underneath; and there is a new county gaol on the road to Shrewsbury. There is a meeting-house for Calvinistic Methodists.

Montgomery is a corporate town; the limits of the borough and parish are the same. The corporation consisted, at the time of the Municipal Commissioners' Reports, of 72 resident burgesses. There is no town-council; but two bailiffs, who have jurisdiction in the borough, are elected by the burgesses in common hall. The corporation remains unaltered by the Municipal Reform Act. The borough has returned one member to parliament from the time of Henry VIII. Llanidloes, Llanfyllin, Machynlleth, and Welsh Pool were formerly contributory boroughs, but had been disfranchised for above a century before the Reform Act, by which they were restored, and Newtown added. The county-court and the election for the county member are held either at Montgomery or Machynlleth.

The living is a vicarage in the archdeaconry of Salop and diocese of Hereford, of the clear yearly value of 347*l.*

There were, in 1833, four day-schools, with 167 children, and two Sunday-schools, with 133 children. One of the day-schools, with 42 children, was partly supported by an endowment and by donations.

Machynlleth, or Machynllaeth, is in the hundred of the same name, 208 miles from London by Bishop's Castle, Newtown, and Llanidloes, or 215 miles by Shrewsbury and Welsh Pool. It has been commonly asserted to have been a Roman station, and some regard it as the Maglove of the 'Notitia;' but the station was probably at Cefyn Caer, near Pennal, or Penalt, in the neighbourhood of Machynlleth, but in an adjoining county. [MERIONETHSHIRE.] It was at Machynlleth that Owen Glyndwr held a parliament or assembly of the chief men of Wales, A.D. 1402, by which his title to the principality was formally acknowledged.

The parish is very extensive, and comprehends three townships, of which two, Uwch-y-Garreg and Is-y-Garreg, are entirely rural. The town is near the confluence of the Dulas with the Dovey. It is neatly and regularly built, and consists of two principal streets in the form of a ⊢ : the streets are wide and spacious. There is a town-hall and market-house, a plain building: the antient building, in which the parliament of Glyndwr assembled, is still standing, but is converted to private use. The church, rebuilt, with the exception of the tower, in the present century, is tolerably large. There are several dissenting places of worship, and there are national school-rooms.

The population, in 1831, was 2381, of which 1657 persons were in the town liberty or township; of the population of Uwch-y-Garreg and Is-y-Garreg townships, more than half was agricultural; of the population of the town liberty scarcely any. The chief manufacture of the town and neighbourhood is that of 'webs,' or coarse woollen cloths and coarse flannels: there are many carding-engines and fulling-mills; the weaving is generally done at the weavers' own cottages; the goods are chiefly sent to the market at Welsh Pool. A good deal of tanning is done. Slate is quarried in the neighbourhood. The river Dovey is navigable to within two miles of the town, and affords facilities for the export of oak-bark and timber, and the import of corn, coals, culm, limestone, raw hides, and other articles.

The markets are on Wednesday and Saturday, and there are at least six fairs in the year.

Machynlleth was formerly a parliamentary borough, contributory to Montgomery; and after being disfranchised above a century, was restored by the Reform Act: the parliamentary limits include the town liberty and a small portion of the township of Is-y-Garreg.

The living is a rectory, in the diocese and archdeaconry of St. Asaph, of the clear yearly value of £230*l.*, with a glebe-house.

There were, in 1833, in the town liberty, one day-school, with 39 children; one day and Sunday national school, with 126 children; and four Sunday-schools, with 665 scholars, 'men, women, and children, of all ages, who continue to attend during the whole of their lives.' The other two townships had two day-schools, with 41 children; and six Sunday-schools, with 486 scholars.

The county court is occasionally held, and the election of the county member occasionally takes place, at Machynlleth.

Newtown (in Welsh, Tre Newydd) is in the hundred of Newtown, 175 miles from London by Bishop's Castle. Little is known of the origin and early history of this place; the increase of the flannel manufacture has brought it prominently into notice. It is in a delightful valley on the right or south bank of the Severn, over which there is a stone bridge of three arches, erected a few years since in place of a more antient one of wood. There is another stone bridge of one arch on the road to Welsh Pool, over a brook falling into the Severn. The older houses are usually of timber and brick, but the houses of later erection are of more respectable appearance. The market-hall, a plain building, stands very inconveniently in the midst of the principal street. The church is an antient structure, of little architectural pretensions: the steeple is low, and is surmounted by a wooden belfry. There are in it some marble monuments of the Pryce family; and a beautiful carved screen, dividing the chancel from the nave, said to have been brought, together with the font, from the abbey of Cwm Hir, in Radnorshire. There are several places of worship for the different dissenting sects. On the north bank of the Severn, in the townships of Hendidley and Gwestydd, in the parish of Llanllwchaiarn, a suburb has been formed, which

has received, and in all probability will receive, great additions.

By the Reform Act, Newtown was added as a contributary borough to Montgomery. The borough comprehends the parish of Newtown and the townships of Hendidley and Gwestydd, in the parish of Llanllwchaiarn. Its boundaries include a considerable rural district; but from the thriving condition of the place, the extension of the town in every direction may be anticipated, and the farmers are said to be connected with the flannel factories in the town. The number of 10*l.* houses within the boundary was estimated by the Boundary Commissioners at 262.

The population of the parish of Newtown in 1831 was 4550, about one-sixth agricultural; that of Llanllwchaiarn was about 2005, less than half agricultural: together 6555, of which about 5000 were resident immediately in the town or suburb. The staple manufacture of Newtown is that of flannel, which is of excellent quality: the manufacture is carried on chiefly in factories, and is conducted with skill. The quality of the water is also considered to conduce to the goodness of the fabric. There are several fulling-mills and bleaching-grounds. There are potteries, tan-yards, and malt-kilns: machinery of various descriptions is manufactured. The Montgomery Canal commences at this town; there is a large basin; and around this, or along the banks of the canal, are lime-kilns, and convenient wharfs and yards for landing and storing coals, bricks, slates, timber, and other articles. There are three weekly markets; on Tuesday for corn and provisions, on Thursday for flannels (lately established), and on Saturday for provisions. There are several yearly fairs, one of them a considerable fair for sheep and pigs. Petty-sessions are held in the town; and, by order issued in a late Gazette, the winter assizes are to be held here. It has been thought that the county gaol was formerly at Newtown: a public house, lately and perhaps still in existence, was called the Old Gaol.

The living is a rectory, of the clear yearly value of 406*l.*, with a glebe-house: that of Llanllwchaiarn is a vicarage, of the clear yearly value of 355*l.*, with a glebe-house: both are in the archdeaconry and diocese of St. Asaph, and in the gift of the bishop.

There were, in 1833, in Newtown and Llanllwchaiarn parishes, thirteen day-schools, with 355 children, and six Sunday-schools, with 1540 scholars.

Welsh Pool (so called to distinguish it from the town of Poole, in Dorsetshire) is locally in the hundred of Pool, 171 miles from London by Shrewsbury, or 176 by Ludlow, Bishop's Castle, and Montgomery. The town derives its name from a deep pool or lake, called Llyn Du, near which it is situated: from the same circumstance of its situation, the town is called, in Welsh, Tre Llyn. Cadwgan, a powerful chieftain of the district of Powys, began to build a castle here A.D. 1109, but it was left unfinished at his death. It was completed by another; and in 1191 was taken, after a long siege, by the English, who repaired and strengthened the defences. It was retaken, A.D. 1197, by the Welsh of Powysland; but these having taken part with the English, the castle was taken from them (A.D. 1223), and dismantled by the prince of North Wales. This castle was afterwards restored, and received the name of Powys Castle, which it still retains. The castle was fortified in the civil war of Charles I. by Lord Powys, the owner of it, who embraced the king's party. It was obliged to surrender, A.D. 1644, to the parliamentary commander, Sir Thomas Middleton.

The town is near the left or west bank of the Severn, in a hollow opening upon that river, and watered by two brooks which flow into the Severn. It consists of two parts, Pool Town and Welsh Town. The principal street runs east and west, and other streets branch from or intersect this at right angles. The main street is well paved; the houses are chiefly of brick, respectable, and built with a regularity not usual in Welsh towns; and from this circumstance, and from the predominance of the English language, Welsh Pool might be taken for an English town. The building used as a town and county hall, with a space beneath for a corn-market, is in the centre of the principal street. The church is spacious and handsome; it was rebuilt, with the exception of the chancel and the tower, in the latter half of the last century, and enlarged in the course of the present century. It is situated on a steep slope, and some parts of the churchyard are higher than the church. There are several dissenting meeting-houses, and a handsome building for the national schools.

The population of the parish of Pool (which is extensive, and has a detached portion in the hundred of Cawrse) was, in 1831, 4533. The principal manufacture is that of flannel, but it is not carried on so extensively as at Newtown, Llanidloes, and Llanbrynmair. The place was however for many years the chief mart for the flannels and webs of the counties of Montgomery and Merioneth; but within the last few years an attempt has been made to make Newtown the mart for flannels. There are several malt-kilns, and a stone-quarry in or near the town. The market for provisions is on Monday, that for flannels on every alternate Thursday. The Montgomeryshire Canal passes close to the town, and the navigation of the Severn begins here. There are several yearly fairs. Petty-sessions are held here, and the spring assizes for the county. The winter assizes have been lately removed to Newtown.

Welsh Pool received at an early period a charter of incorporation from the lords of Powys; but the governing charter is of James I. By the Municipal Reform Act the corporation consists of four aldermen and twelve councillors. The borough has a commission of the peace. The corporate jurisdiction extends over the whole parish, and parts of some other parishes. The borough was antiently contributory to Montgomery, but had lost the franchise for more than a century when it was restored by the Parliamentary Reform Act. The parliamentary borough includes nearly the whole of Pool parish, and a small part of the parish of Guilsfield.

The living of Welsh Pool is a vicarage, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 273*l.*, with a glebe-house.

There were in the parish, in 1833, twelve day-schools, with 303 children; two national schools, with 233 children; and three Sunday-schools, with 550 children. Two of the day-schools have a small endowment, for which some of the children are educated.

Powys Castle is in a spacious well-wooded park, on the south side of the town. It stands on a rocky ridge or elevation, and is built of red-sandstone, whence its antient name of Castell Coch, or Red Castle. The different parts of this castle are of various dates, and in varying and incongruous styles of architecture. The repairs lately carried on under the direction of Sir Robert Smirke, which are said to 'accord with the original design of the antient edifice,' have perhaps removed these incongruities. The interior has a heavy and gloomy appearance; but it is adorned with portraits and other paintings, some of them by the best masters, statues, vases, and other antiquities. The gardens are (unless lately altered) laid out in the old style, with terraces, clipped shrubs, and the remains of waterworks. Powys Castle is the seat of the Clive family.

Llanidloes is in the hundred of Llanidloes, 188 miles from London, through Bishop's Castle and Newtown. The town is in a pleasant vale watered by the Severn, on the south-east bank of which, 12 miles from its source, the town stands. The hills which bound this vale are chiefly laid out in sheep-walks. Llanidloes consists of two principal streets, crossing each other at right angles, and of some inferior ones. The houses were a few years since almost entirely built with timber frames and the intervals filled up by laths and mud or plaster; many were roofed with slabs of oak timber, cut into the form of slates; the streets, which are wide, were also disfigured by ashes or other refuse heaped up in front of the houses. But of late years great improvements have been made; many houses of better construction have been erected in the room of older structures, and the street nuisances have been cleared away. There are two bridges over the Severn, one of them is a handsome stone bridge of three arches. The market or town-house is in the middle of the town; it is a massy building framed with timber and the intervals filled up of lath and plaster or mud. The church consists of a nave and aisle separated from each other by curious clustered pillars, the capitals of which are decorated with palm-leaves. The roof of the nave is adorned with carved figures of cherubim holding shields charged with exquisitely carved armorial bearings. The columns and the carved work of the roof are said to have been brought from Cwm Hir Abbey in Radnorshire. There are several dissenting places of worship.

The parish is very extensive, including large tracts of waste land on the slope of Plinlimmon. The population in 1831 was 4189, of which population 2562 persons were in the township of Llanidloes. The staple manufacture of

the place is flannel. There are several factories for carding and spinning the wool, and fulling-mills. The weaving is done chiefly at the weavers' houses. The flannel made here is perhaps not so fine as that of Newtown, but more durable. There are, in and round the town, several malt-houses or kilns, flour-mills, and tan-yards. Coarse slate and building-stone are quarried in the surrounding hills. There is a market on Saturday for wool, corn, and provisions; and several fairs in the year, some of which are great sheep-fairs.

Llanidloes is a corporate town, but the corporation is not noticed in the Municipal Reform Act, or in the Corporation Commissioners' Reports. It was antiently a contributory borough to Montgomery, and, like Machynlleth, Llanfyllin, and Welsh Pool, was restored by the Reform Act, after a disfranchisement of a century. The boundary of the restored borough is much more comprehensive than that of the old borough. The number of qualifying (*i.e.* 10*l.*) houses within the boundary was estimated by the Boundary Commissioners at 124.

The living of Lanidloes is a vicarage in the peculiar jurisdiction of the bishop of Bangor; its clear yearly value is 151*l.*, with a glebe-house.

There were in the parish in 1833 five day-schools (one partly supported by subscription), with 204 scholars, and seventeen Sunday-schools, with 2084 scholars. The following observations, from the overseers, are of importance, as explaining the nature of Welsh dissenting Sunday-schools. 'They are a kind of mixed congregation of all ages, parents with their children, heads of families with their servants. . . . The number of children, under 14 years of age, taught to read at these meetings scarcely amounts to one-third of the whole number returned; the rest being engaged in reading, repeating portions of scripture, or catechisms from memory, intermixed with praying and singing, making them upon the whole religious meetings rather than schools.'

Llanfyllin, or Llanvyllin, is in the hundred of Llanfyllin, 179 miles from London, by Shrewsbury and Llandrinio Bridge, or 180 miles by Shrewsbury and Montford Bridge; in a pleasant valley watered by the Cain, an affluent of the Vyrnwy. The town is on the south bank of the Cain, and is very small. The principal street runs east and west, and is crossed by the Abel brook, which flows into the Cain; over this brook is a neat bridge. There is a town-hall, a neat brick building with a covered area for a market underneath, on one side of the principal street. The church is a brick building erected early in the last century.

The population of the parish (which is of considerable extent) was, in 1831, 1836; of whom 858 were in the town. There is little business carried on; a small quantity of leather and malt is made and sent to neighbouring markets. The market is on Thursday, and there are several fairs.

Llanfyllin was incorporated by Llewelyn ap Gryffydd, a Welsh chieftain in the time of Edward II.; two bailiffs are chosen yearly (one by the lord of the manor, another by the burgesses), who are justices of the peace for the borough. The parliamentary franchise, which had been lost for a century, was restored by the Reform Act, and the limits of the borough considerably enlarged. Llanfyllin is contributory to Montgomery. It was estimated by the commissioners to contain about 60 qualifying or 10*l.* houses.

The living is a rectory in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 485*l.* with a glebe-house. There were in 1833 in the parish two day-schools with 60 children; two day and Sunday national schools, with 121 children in the week days, and a smaller number on Sundays; and five Sunday schools, with 150 scholars. The national schools are partly supported by endowment.

Llanfair, or Llanvair Caer Einion, is in the hundred of Mathrafal and near the centre of the county, 183 miles from London through Bishop's Castle, Montgomery, and Welsh Pool. The town is on a rising ground on the south bank of the Vyrnwy. It is neatly built and of pleasing appearance; the two principal streets intersect each other, nearly at right angles. There is a plain but neat and commodious town-hall, with a market-house underneath. The church is an antient building, capable of accommodating 500 persons. There are several dissenting places of worship.

The population in 1831 was 2687, about half agricultural. The principal manufacture is that of flannel, but it is carried on only to a very small extent. There is a market on Saturday, and there are several yearly fairs.

The living of Llanfair is a vicarage, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 338*l.*, with a glebe-house.

There were in 1833, in the parish, one infant or dame-school, with 46 children; four day-schools, with 112 children; and four Sunday-schools, with about 300 scholars.

There are traces of a Roman road about two miles south of the town, and some Roman antiquities have been dug up in the neighbourhood.

Llanbrynmair is a village in Machynlleth hundred, on the road between Llanfair and Machynlleth. The parish, which is of considerable extent, abounds with delightful scenery. It had, in 1831, a population of 2040. A considerable quantity of flannel is made in this parish: the manufacture employs above 100 men in weaving, besides those occupied in carding and spinning wool. Peat is dug in the parish. The church is an antient structure, adorned with some fine specimens of carved oak. There are some fine yew-trees in the churchyard.

The living is a vicarage, of the clear yearly value of 330*l.*, with a glebe-house: part of the revenue is appropriated to a sinecure rectory, the clear yearly revenue of which is 65*l.* The benefice is in the archdeaconry and diocese of St. Asaph.

There were in the parish, in 1833, three day-schools, partly supported by endowment or gift, with 128 children, and nine Sunday-schools, with 1285 scholars.

Llangynnog, or Llangynog, is a village in Llanfyllin hundred, on the road from Llanfyllin to Bala, in Merionethshire: it is in a pleasant but narrow vale, watered by the Tanat, and surrounded by lofty and steep mountains. The parish, which is about four miles long and as many broad, is the chief seat of the mineral wealth of the county. The village was characterised by Mr. Bingley (*Tour in Wales*, A.D. 1798) as 'small and dirty.' There are many detached farm-houses in the valley. The church is a small antient building, and there are one or two dissenting meeting-houses. The population of the parish, in 1831, was 499: 16 men were employed in slate-quarries, and 20 in lead-mines. The principal lead-mine was discovered in A.D. 1692, and was worked so successfully as to yield for forty years a yearly profit of 20,000*l.* After the working had been discontinued for many years, owing to the influx of water, the mine was drained and the working resumed. After a second discontinuance, it was again resumed, and is still carried on. The slates quarried are of tolerably good quality. Lead-mines appear to have been wrought in this valley at an early period.

The living is a rectory, in the archdeaconry and diocese of St. Asaph, of the clear yearly value of 126*l.*, with a glebe-house. There were in the parish, in 1833, two Sunday schools with 192 scholars, and a small endowment for a day-school.

Divisions for Ecclesiastical and Legal Purposes.—The county is for the most part in the archdeaconry and diocese of St. Asaph. Those parishes in the hundreds of Cawrse and Pool which are east of the Severn, and the whole hundred of Montgomery (except the parishes of Kerry and Moughtrey, which are in the diocese of St. David's, and in the archdeaconries of St. David's and Brecon respectively), are in the archdeaconry of Salop and the diocese of Hereford. The hundred of Llanidloes is in the peculiar jurisdiction of the bishop of Bangor. The number of parishes wholly or partly in the county is fifty-seven, but six belong chiefly to other counties. Of the remaining fifty-one, thirty-six are in the diocese of St. Asaph, six in that of Hereford, seven in Bangor, and two in St. David's. There are twenty-two rectories, eighteen vicarages, ten perpetual curacies, and one chapelry, beside three sinecure rectories: making in all fifty-four benefices. Of these eleven are under 100*l.* annual value, fifteen under 200*l.*, eleven under 300*l.*, eleven under 400*l.*, two under 500*l.*, and three under 600*l.* Of one no return has been made. The livings, with the exception of those in the diocese of Hereford, are mostly in the gift of their respective diocesans. All these dioceses are in the ecclesiastical province of Canterbury.

The county is included in the North Wales circuit. The assizes were, till lately, held at Welsh Pool; but, by order published in a late Gazette, they are to be held in the spring at Welsh Pool, and in the winter at Newtown. The county gaol and house of correction are at Montgomery, where the quarter-sessions for the county are held.

The county returns one member to parliament, and Montgomery with its contributory boroughs another. The court of election for the county member is held either at

Montgomery or Machynlleth; and the polling-stations are Montgomery, Machynlleth, Llanidloes, Llanfyllin, and Llanfair. The contributory boroughs to Montgomery were antiently Llanidloes, Llanfyllin, Machynlleth, and Welsh Pool; but these were virtually disfranchised by the decision of a committee of the House of Commons, A.D. 1728, and the elective franchise was monopolised by the burgesses of Montgomery alone, until the former contributory boroughs were restored, and Newtown added as another contributory borough, by the Reform Act. All the old boroughs, except Montgomery, were enlarged by the Boundary Act.

History and Antiquities.—Montgomeryshire was, with the neighbouring counties, included, during the period of British independence, in the territory of the Ordovices, and on the reduction of the island under the Roman power, in the province of Britannia Secunda. It contains several memorials of Roman domination. The station Mediolanum, mentioned by Antoninus and Richard of Cirencester, is thought by the best antiquarians to have been in this county, though its exact site is not ascertained. It is supposed by some to have been on the bank of the Tanad (a site which will accord with its position in Richard's 'Itinerary'), between Heriri Mons (Tommen-y-Mûr, near Bala) and Rutunium (Rowton, near Shrewsbury); other authorities propose on plausible grounds to fix it at Myfod on the Vyrnwy. It is supposed that there was a station at Cefyn Caer [MERIONETHSHIRE], near Machynlleth. Some writers will have this to be the Maglove of the 'Notitia;' but there is so much uncertainty as to the stations of the 'Notitia,' that this can be regarded as merely a conjecture. Various Roman antiquities have been found near Machynlleth. The site of a Roman camp is traceable at Caer-Sws, about five miles west of Newtown: it appears to have been quadrangular, about 600 feet in length and 300 broad. Several Roman bricks were dug up in one angle of this camp, and employed in building a chimney in the neighbourhood. There are other marks of intrenchments near it, and traces of a Roman road called 'Sarn Swsan.' A Roman fortress is said to have stood at Castell Caer Einion, about four miles from Llanfair, but there are now no traces of it.

After the withdrawal of the Romans we hear nothing of this county for many years. It was the scene of hostility between the Welsh and the Mercians under Offa. The celebrated 'dyke' made by the latter traverses the county from north to south, passing a little to the east of Welsh Pool and Montgomery, and including the eastern part of the county in the Saxon territory. The rest of the county was included in Powys or Powysland, a designation which had previously been given to this part of Wales. In the latter part of the ninth century Powys became a separate principality, under chieftains who had their residence at Mathrafal, near the banks of the Vyrnwy, above Myfod. These princes of Powys were engaged in frequent hostilities with the Mercian Saxons along the border. There are some earthworks and other traces of the castle of the princes of Powys at Mathrafal.

In the year 894, in the reign of Alfred, the Danes entered the county. Hastings, or Hasten, or Hesten, their leader, had invaded the eastern parts of England; and in his third campaign, A.D. 894 or 895, he entrenched himself at Buttington, on the east bank of the Severn, close to Welsh Pool. There he was besieged by Alfred's thanes, until, reduced to desperation by famine, he broke through the blockading force, and with fearful loss returned to his former quarters on the east side of the island.

After the Conquest, Powys became the continual object of attack by the Norman lords of the marches or frontiers. These hostilities led to the erection of the castles of Montgomery by the Normans, and Powys, near Welsh Pool, by the Welsh, and to a continued and severe struggle for the possession of these strongholds. The division of Powysland between two chieftains served to weaken the Welsh power, and to augment the predominance of the Norman barons.

In the latter part of the eleventh century a desperate engagement was fought on the hills of Carno, near the Afon Garno, between the forces of Gryffydd ap Cynan, lawful claimant of the throne of Gwynedd, or North Wales, assisted by Rhys ap Tewdwr, prince of South Wales, against those of Trahaiarn ap Caradog, his usurping competitor. The engagement was the most bloody of any recorded in the Welsh annals, and ended in the death of Trahaiarn and the entire defeat of his army.

The independence of Powys was overthrown before the final subjugation of North Wales: it became an English lordship, which remained for many years in the posterity of John de Charlton, who, in the time of Edward II., married the heiress of the Welsh chieftains. The barony and title passed to the Greys, a Northumberland family, until it became extinct in the reign of Henry VIII. The only remaining castles, or ruins of castles, appear to be those of Montgomery and Powys. There do not appear to be any monastic ruins in the county; none, at any rate, of importance.

In the civil wars of Charles I. Montgomery and Powys castles were the objects of contest. The incidents of the war are noticed above, in the account of the towns of Montgomery and Welshpool.

(Pennant's and Bingley's *Tours in Wales; Beauties of England and Wales;* Arrowsmith's *Map of England and Wales;* Greenough's *Geological Map; Reports of Boundary and Municipal Corporation Commissioners*, and other *Parliamentary Papers.*)

STATISTICS.

Population.—Montgomeryshire is mostly an agricultural county. Of 16,723 males twenty years of age and upwards, 4295 are engaged in agricultural pursuits, and 1639 in manufactures or in making manufacturing machinery. This latter number is chiefly employed in weaving, an occupation followed in this county more than in any other county of Wales. At Llanidloes 323 men are so employed, and in making machinery for that purpose and in other branches of the woollen manufacture. There are 549 woollen weavers at Newton, 180 at Llanllwchaiarn, 109 at Llanbrynmair, at Welsh Pool 68; indeed scarcely any parish throughout the county is deficient in this species of manufacture.

The following table contains a summary of the population, &c., of every hundred, as taken in 1831:—

HUNDREDS, &c.	HOUSES.				OCCUPATIONS.			PERSONS.			
	Inhabited.	Families.	Building.	Uninhabited.	Families chiefly employed in agriculture.	Families chiefly employed in trade, manufactures, and handicraft.	All other Families not comprised in the two preceding classes.	Males.	Females.	Total of Persons.	Males twenty years of age.
Cawrse (hundred) .	451	486	2	12	356	76	54	1382	1330	2,712	718
Deythur " .	441	503	6	7	338	99	66	1231	1186	2,417	641
Llanfyllin " .	1235	1336	6	61	726	313	297	3496	3353	6,849	1703
Llanidloes " .	2178	2338	17	49	1090	807	441	5923	6236	12,159	2878
Machynlleth " .	1517	1613	7	94	720	468	425	3881	4046	7,927	2011
Mathrafel " .	1162	1232	6	28	626	289	317	2917	2982	5,899	1493
Montgomery " .	974	1090	3	26	602	262	226	2883	2649	5,532	1505
Newton " .	2496	2931	8	96	1233	1231	467	6930	7000	13,930	3546
Pool . " .	722	809	1	7	626	138	45	1863	1939	3,802	956
Pool (town) . .	993	1069	6	22	293	515	261	2542	2713	5,255	1272
Total .	12,169	13,407	62	402	6610	4198	2599	33,048	33,434	66,482	16,723

The population of Montgomeryshire, as given at each time the census was taken, was as under:—

	Males.	Females.	Total.	Increase per cent.
1801	..	..	47,978	..
1811	..	..	51,931	8·23
1821	29,743	30,156	59,899	15·34
1831	33,048	33,434	66,482	10·99

showing an increase between the first and last periods, of 18,504, or nearly 39 per cent. on the whole population; being 19 per cent. less than the whole rate of increase throughout England.

County Expenses, Crime, &c.—The sums expended for the relief of the poor at the three dates of—

		£		s.	d.	
1811	were	32,297,	being	12	5	for each inhabitant.
1821	..	38,273	„	11	1	„
1831	..	34,815	„	10	5	„

The sum expended for the same purpose for the year ending March, 1838, was 22,235*l.*; and assuming that the population had increased at the same rate of progression as in the ten preceding years, the above sum gives an average of 6*s.* 2½*d.* for each inhabitant. These averages are above those for the whole of England and Wales.

The sum raised in this county for poor-rate, county-rate, and other local purposes, in the year ending the 25th of March, 1833, was 43,974*l.* 11*s.*, and was levied upon the various descriptions of property as follows:—

On land . . .	£39,680	0*s.*
Dwelling houses .	3,374	19
Mills, factories, &c. .	721	16
Manorial profits, navigation, &c.	197	16

The amount expended was—

For the relief of the poor . .	£35,346	8*s.*
In suits of law, removal of paupers, &c.	1,377	8
For other purposes . .	6,848	11
	£43,572	7

In the returns made up for subsequent years the descriptions of property assessed are not specified. In the years 1834, 1835, 1836, 1837, and 1838, there were raised 42,606*l.* 7*s.*, 40,503*l.* 13*s.*, 37,412*l.* 11*s.* (not given for 1837 in government tables), and 31,536*l.* respectively; and the expenditure for each year was as follows:—

	1834. £	1835. £	1836. £	1837. £	1838. £
For the relief of the poor	34,201	31,945	29,443	28,278	22,235
In suits of law, removal of paupers, &c. .	1,315	887	680	763	283
Payments towards the county-rate . .	6,344	4,952	4,946	not given	4,649
For all other purposes		2,163	2,102	1,787	1,840
Total money expended	£41,860	39,943	37,172	30,828	29,007

The saving effected on the whole sum expended in 1838, as compared with that expended in 1834, was therefore 12,853*l.* 7*s.*, or about 30¾ per cent.; and the saving effected on the sum expended for the relief of the poor was 11,966*l.* 4*s.*, or 35 per cent. as compared with the expenditure in 1834.

The number of turnpike trusts in Montgomeryshire, as ascertained in 1835, under the acts 3rd and 4th Wm. IV., chap. 80, was 5; the number of miles of road under their charge was 450. The annual income arising from tolls and parish composition in lieu of statute duty, in 1835, was 18,297*l.* 16*s.*, and the annual expenditure in the same year was as follows:—

	£	s.	d.
Manual labour	4,548	17	0
Team labour and carriage of materials	166	11	0
Materials for surface repairs .	252	17	0
Land purchased	63	13	0
Damages done in obtaining materials	9	10	0
Tradesmen's bills	101	14	0
Salaries of treasurer, clerk, and surveyor	949	4	0
Law charges	1,325	13	0
Interest of debt	2,383	5	0
Improvements	6,160	6	0
Debts paid off	150	0	0
Incidental expenses . .	418	4	0
Estimated value of statute duty performed	2,237	9	0
Total .	£18,757	3	0

The county expenditure in 1834, exclusive of the relief for the poor, was 5306*l.* 16*s.*, disbursed as follows:—

	£.	s.	d.
Bridges, building, and repairs, &c.	3,199	12	0
Gaols, houses of correction, &c., and maintaining prisoners, &c. .	504	0	0
Prosecutions	523	15	0
Clerk of the peace . . .	91	8	0
Conveyance of prisoners before trial .	84	18	0
Conveyance of transports . .	47	10	0
Coroner	169	14	0
Debt, payment of, principal and interest	311	2	0
Miscellaneous . . .	374	17	0
Total	£5,306	16	0

The number of persons charged with criminal offences in the three septennial periods ending with 1820, 1827, and 1834, were 191, 157, and 222, making an average of 27 annually in the first period, of 22 in the second period, and of 32 in the third period. The number of persons tried at quarter-sessions in each of the years 1831, 1832, and 1833, in respect to which any costs were paid out of the county rates, were 11, 12, and 30 respectively. Among the persons charged with offences, there were committed for—

	1831.	1832.	1833.
Felonies . .	9	10	30
Misdemeanors .	2	2	0

The total number of committals in each of the same years was 6, 7, and 34 respectively.

	1831.	1832.	1833.
The number convicted was . .	9	8	30
The number acquitted was . .	1	4	10
Discharged by proclamation . .	1	4	10

At the assizes and sessions in 1838, 48 persons were charged with crimes in Montgomeryshire, out of which number 10 had committed offences against the person, two of which were common assaults; one was charged with an offence against property committed with violence; 28 with offences against property committed without violence. The remaining 9 were committed for riot or breach of the peace, &c.

Of those committed 33 were convicted, and 15 acquitted or no bill found against them. Of those convicted 1 was sentenced to transportation for 10 years and 2 for 7 years, 1 to imprisonment for 1 year, 18 for 6 months or under, and 11 were fined. Of the offenders 42 were males and 6 were females. Among the whole number, 3, accused of breach of the peace, were superiorly instructed; 1 could read and write well, 19 could read and write imperfectly, and 16 could neither read nor write: the degree of instruction of 9 was not ascertained.

The number of persons qualified to vote for county members in Montgomeryshire is 2819. Of these 1539 are freeholders, 203 leaseholders, and 1077 occupying tenants. The number of voters is about one in 24 to the whole population, and one in 6 to the male population twenty years and upwards, as taken at the census of 1831.

There are four savings' banks in this county. The number of depositors and amount of deposits on the 20th November were:—

	1832.	1833.	1834.	1835.
Number of depositors . .	1120	1161	1284	1417
Amount of deposits . . .	£31,174	32,036	35,527	38,772

The various sums placed in the savings' banks in 1836, 1837, 1838, were distributed as under:—

	1836.		1837.		1838.	
	Depositors.	Deposits.	Depositors.	Deposits.	Depositors.	Deposits.
Not exceeding £20	746	£ 6,473	837	£ 6,750	863	£ 7,681
„ 50	543	16,458	555	17,826	641	19,556
„ 100	168	11,834	191	12,152	194	13,169
„ 150	34	3,621	44	5,754	46	5,487
„ 200	22	3,760	20	3,689	18	3,214
Above . . 200	7	1,624	8	1,857	10	2,330
	1,590	43,770	1,655	48,021	1,772	51,437

Education.—The following summary is taken from the Educational Returns laid before parliament in the sessions of 1835: the inquiry was made in 1833.

	Schools.	Scholars.	Total.
Infant schools . . .	6		
Number of children at such schools; ages from 2 to 7 years:—			
Males . .		7	
Females . .		33	
Sex not specified .		59	
		—	99
Daily schools . . .	120		
Number of children at such schools; ages from 4 to 14 years:—			
Males . .		1,837	
Females . .		1,426	
Sex not specified .		1,305	
	—	—	4,568
Schools . .	126		—
Total of children under daily instruction			4,667
Sunday-schools . . .	192		
Number of children and others at such schools; ages from 4 to 70 years:—			
Males . .		4,652	
Females . .		4,393	
Sex not specified .		7,433	
		—	16,478

Assuming that the population had increased between 1831 and 1833 in the same ratio as in the ten preceding years, and that the children between the ages of 2 and 15 years bore the same proportion to the whole population as in 1821, then we obtain 22,604 as the approximate number of children between those ages living in Montgomeryshire in 1833. Fourteen Sunday-schools are returned from places where no other school exists, and the persons who attend them (1144 in number) cannot be supposed to attend any other school; at all other places Sunday-school children have opportunity of resorting to other schools also, but in what number, or in what proportion duplicate entry of the same children is thus produced, must remain uncertain. Thirteen schools, containing 846 children, which are both daily and Sunday schools, are returned from various places, and duplicate entry is therefore known to have been thus far created. Some of the Sunday-schools consist of adults and aged persons as well as children. Making allowance for these two causes for inaccuracy, we may perhaps fairly conclude that not more than three-fourths of the whole number of children between the ages of 2 and 15 are receiving instruction in Montgomeryshire.

Maintenance of Schools.

Description of Schools.	By endowment.		By subscription		By payments from scholars.		Subscrip. and payment from scholars.	
	Schls	Scholars.	Schls.	Scholars.	Schls.	Scholars.	Schls.	Scholars.
Infant Schools	—	—	—	—	6	99	—	—
Daily Schools	21	1004	9	754	81	2392	9	419
Sunday Schools	5	376	182	15,895	1	45	4	162
Total...	26	1380	191	16,649	88	2536	13	580

The schools established by dissenters, included in the above statement, are—

		Scholars.
Daily schools . .	7, containing	221
Sunday-schools .	143 „	12,774

The schools established since 1818 are—

		Scholars.
Infant and other daily schools	61, containing	2,464
Sunday-schools . .	161 „	14,305

No school in this county appears to be confined to members of the Established Church or of any other religious denomination, such exclusion being disclaimed in almost every instance, especially in schools established by dissenters, with whom are here included Wesleyan Methodists. Lending libraries of books are attached to 4 schools in Montgomeryshire.

MONTH. [MOON; YEAR.]

MONTI, VINCENZO, born in 1753, near Ferrara, in the Papal State, studied at Ferrara under the poet Minzoni, and gave early indications of poetical genius, as well as of correct taste in refusing to join the effeminate race of sonneteers and courtly versifiers, and resorting to the good old racy style of Dante for his model. From Ferrara Monti repaired to Rome, the capital of his native country, and the general resort of aspiring unprovided provincials who looked for patronage and support. In that metropolis he was fortunate enough to be introduced to Don Luigi Braschi, the favourite nephew of the then reigning Pope Pius VI., and was retained by that nobleman as his secretary, an office well suited to the habits and disposition of the young poet. He assumed the convenient costume of an Abbé, which at Rome was a general passport into society, and did not bind the wearer to any clerical duties or vows. Monti was now in a fair way to favour: he wrote amatory verses for the fair and sacred elegies for the church, was noticed by prelates and cardinals, was admitted into the Academy of the Arcadians, and had disputes with several members of that pedantic assembly. He was abused and slandered because he took no pains to conceal his contempt of his brother versifiers. He bore the annoyance for some time, but at last his spirit, naturally intolerant, rose under the persecution of mediocrity, and he repaid his adversaries with interest in a 'Sonetto colla Coda,' or 'sonnet with a tail,' a satirical composition addressed to father Quirinus, in which he draws, in a few angry satirical strokes, a sketch of his enemies, using the plainest vituperatives, and a phraseology compared with which Byron's 'English Bards and Scotch Reviewers' might be called a model of urbanity. Alfieri's dramas were at that time the subject of general discussion in Italy. With all their faults, they bore the stamp of a superior mind, and Monti readily acknowledged the powers of the writer, but he disapproved of the abruptness and stiffness of his diction, and of the frequent inharmoniousness of his verse. Monti thought, and with reason, that the language of Italy was fully capable of expressing energy without harshness, and in order to demonstrate this he composed in 1786 his tragedy of 'Aristodemo,' which was received with great applause, and established his literary reputation. The 'Aristodemo' is a strictly classical drama, and is a fine specimen of that species of composition The subject, taken from Pausanias, is the voluntary death of the king of Messene, after having concluded peace with Sparta. Remorse for an atrocious though secret crime, the murder of his own daughter, committed by Aristodemus in his younger years, through the force of disappointed ambition, and a gloomy belief in the unavoidable decrees of fate, are the leading features of the character of the king, which is delineated with fearful and solitary grandeur. Touches of softer feeling appear here and there like wild flowers amidst a barren desert, and serve to relieve the deep shade of terror which pervades the whole drama.

Monti dedicated his drama to the Duchess Braschi, his patron's consort, who was then the reigning beauty of Roman fashionable society, and to whom he addressed also other minor compositions, among which is his beautiful allegory of 'Amor Pellegrino.'

When Pius VI. proceeded to Vienna to remonstrate with Joseph II. on his ecclesiastical reforms, Monti wrote a poem on the subject of that journey, entitled 'Il Pellegrino Apostolico,' which, like all Monti's works, contains great beauties of execution.

The tragical death of Hugo de Bassville, the agent of the French republic, who while endeavouring to excite a revolution at Rome was murdered in the streets by the populace, in January, 1793, suggested to Monti the idea of a poem in terza rima, which he entitled the 'Basvilliana.' The poet represents the soul of Bassville issuing out of its bleeding body, when a tutelary angel comforts the trembling spirit with the assurance that its sins are remitted, but that eternal justice has decreed that it shall wander over the earth and witness the horrors which are being perpetrated in France, until the measure of God's wrath shall be full, and that country shall have expiated its crimes. The soul of Bassville takes an affecting leave of its earthly frame, the companion of its mortal career.

Poscia l'ultimo sguardo al corpo affisse,
Già suo consorte in vita, à cui le vene
Sdegno di zelo e di ragion trafisse;
Dormi in pace, dicendo, o di mie pene
Caro compagno, infin che del gran die
L' orrido squillo a risvegliar ti viene:
Lieve intanto la terra, e dolci e pie
Ti sien l'aure e le pioggie, e a te non dica
Parole il passeggier scortesi e rie.'

The spirit takes its flight towards France, and the poem, which is an imitation of Dante's 'Comedia,' consists of descriptions of the scenes which it witnesses, the massacres, the anarchy, the execution of Louis XVI., interspersed with dialogues with the souls of other victims of the Revolution Some of the descriptions are truly magnificent, such as that of

the gigantic cherub watching over the Vatican, the account of the horrors of Marseille, the description of Paris under the reign of terror, and the tragedy of the 21st of January, when the poet introduces the shades of former regicides and of infidel writers exulting at the execution of Louis, and the phantoms of the antient Druids rejoicing in the sight of bloody holocausts renewed. Among the strange but striking conceptions of the poet, we may notice one in canto iv., where the angel tells Bassville that the souls of several revolutionists and members of the Convention have been sent to eternal torments before their natural death, and that demons have taken possession of their bodies, so that these satanic incarnations breathe and act, sit in the Convention, and write and speak under the inspiration of the intrusive spirits, but in appearance as if the bodies were still animated by their former possessors. The poem, which was left unfinished, ends with canto iv., when war is proclaimed in heaven, and echoed throughout Europe, against France.

The 'Basvilliana' had an astonishing success: eighteen editions of it appeared in the course of six months. Fantastic as the conception may appear, it is still considered as Monti's best work.

When the French armies invaded North Italy and occupied Ferrara, the country of Monti, the poet left Rome and repaired to Milan, the capital of the new Cisalpine republic. Here he was in a new atmosphere, and he wrote in favour of republics and revolutions: among others he composed a savage song for the theatre of La Scala on the occasion of the festival of the 21st of January, 1799, the anniversary of the day of the execution of Louis XVI., an act which he had so violently execrated a few years before in the 'Basvilliana.' About the same time he wrote his famous sonnet against England, beginning 'Luce ti nieghi il sol, erba la terra,' and in which, after a shower of invectives and curses, he foretells the day when, stripped of all her ill-gotten wealth, Britain shall be reduced to the primitive occupation of fishing to support herself:

' . . . . . . all 'amo abbandonato,
Farai ritorno pescatrice ignuda.'

At the epoch of Suwarrow's invasion of Italy in 1799, Monti, with many others, took refuge in France, from whence he returned after the battle of Marengo. On his return he wrote a beautiful song in praise of his native country, which was set to music and became very popular:

' Bella Italia, amate sponde,
Pur vi torno a riveder,
Freme in petto e si confonde
L'alma oppressa dal piacer.'

He also wrote his second political poem, which he styled a 'Cantica,' on the death of his friend Mascheroni, a man of science and letters, who had died in France, in exile, in 1799. It is a vision, like the 'Basvilliana,' but the sentiments are more placid and humane. There is the same difference between the two as there is between the 'Inferno' and the 'Purgatorio' of Dante. While we admire the splendour of the 'Basvilliana,' we feel more at ease, our sympathies are better engaged, in reading the 'Mascheroniana.' Monti introduces the poet Parini, who died after the invasion of Italy by the Austro-Russians, relating to Mascheroni the vicissitudes of his country. The stern soul of Parini detested the dishonesty and the ravings of the pretended republicans: 'He had seen ill-fated Italy clad in a mantle of mock liberty, and exposed to the scorn of the stranger. Iniquitous laws emanated from the new legislators; vanity and ignorance, frenzy and discord, filled the senate hall; whilst the sighs of the people were unheeded at the bar. The measure of guilt was at last filled; plunderers were wallowing in plenty, upright men shed tears of distress, and our Lycurguses were meantime feasting at table, seated between Cypris and Bacchus. But the northern storm came with a horrid blast from the Noric Alps, and put an end to their unhallowed carousal. Then fresh disasters befell my poor country.' Next follows a brilliant sketch of Bonaparte's Egyptian campaign, his return to France, his victory over his enemies, foreign and domestic—the whole crowned by the battle of Marengo.

Monti's drama called 'Caio Gracco' contains some impressive scenes, but the play is altogether inferior to the 'Aristodemo.' His third tragedy, 'Galeotto Manfredi,' founded upon an incident of the Italian middle ages, is still weaker.

Monti was appointed professor of eloquence at Pavia; and in 1805, Napoleon having made himself king of Italy, appointed Monti to be historiographer of the new kingdom. The poet, instead of history, wrote verses; and in 1806 he published six cantos of a poem in praise of Napoleon, which he entitled 'Il Bardo della Selva Nera.' It related the war of 1805, the great battle of Austerlitz, the exaltation of the elector of Bavaria (the ally of Napoleon) to the dignity of king, and the marriage of his daughter with Eugène. In this composition Monti indulged, as usual, in vituperations against the Austrians and other enemies of France. But the Austrians were soon after reconciled to Napoleon, whose interest it was not to allow them to be insulted. The Russians however still remained at war, and Monti might revile them as 'northern barbarians;' but after the peace of Tilsit, their emperor, having become the ally of France, could no longer be abused with impunity. Monti, supple as he was, appears to have been puzzled with these continual transformations of friends into enemies and *vice versâ*, and he left his poem unfinished. He might however still find means of eulogising Napoleon without offending others: accordingly he wrote his praises and those of his brother Joseph; he wrote on the birth of Eugène's children, and on the second marriage of Napoleon himself: he was, in fact, court poet to the whole dynasty. He did not remain unrewarded: he was made a knight of the iron crown and of the legion of honour; he received another decoration and a pension from Murat; and he became also, what he really deserved to be, a member of the Institute of the kingdom of Italy. He enjoyed quietly his honours till 1814, when another 'northern storm' again came to disturb the good people of Milan. Monti was now growing old, and, accustomed to political vicissitudes, he bowed to the new conquerors. Being requested by the authorities to write something for the imperial dynasty of Austria, he complied, and sang the praises of the 'just and pacific government of Francis,' in two short dramatic pieces: one in May, 1815, on the occasion of the archduke John of Austria receiving the oath of the Lombard anthorities; another in January, 1816, on the occasion of a visit of the emperor himself to Milan. His pension was continued to him by the Austrian government, and he remained at Milan. After the marriage of his only daughter with Count Perticari of Pesaro, both father and son-in-law engaged in a philological work, entitled 'Proposta di alcune correzioni ed aggiunte al Dizionario della Crusca,' which became the signal of a paper war between the Tuscan and the Lombard literati, or rather between the ultras of both parties, the Crusca and the Anti-Crusca. [CRUSCA, ACCADEMIA DELLA.] Monti's 'Proposta' is valuable, not only as a supplement to the Italian Dictionary, but as a store of erudition: it contains several disquisitions or essays upon questions connected with philology and history.

Monti was a classicist, and, as such, waged war against the 'Romantici,' as they are called, or that school of writers who have undertaken to modernise the literature of Italy. In one of Monti's latest effusions, 'Sermone sulla Mitologia,' we find condensed, in elegant verse, Monti's creed concerning poetical composition. He exclaims against the 'northern school,' that has 'decreed the death of all the gods of Olympus.' Monti pleads for mythology and classicism like an able advocate in a weak cause; but when he says that under the new or romantic school every object in nature becomes inanimate and unimpressive; that the sun is degraded to a mere huge immoveable disk of fire; the sea is nothing more than a deep excavation, filled with slimy unseemly monsters; that all creation, in short, becomes divested of poetry,—he speaks as a prejudiced partisan; he forgets that there are beauties in nature older than and independent of the fictions of mythology; he forgets the magnificent poetry of the Old Testament; he forgets the poetry of Shakspere and Ariosto; he forgets that of his own 'Basvilliana,' the most splendid of his works; he forgets that even his favourite authors, Dante and Tasso, besides numerous others, have painted the sea, the firmament, and the fields of the earth in the most poetical colours, without having recourse to Phœbus and Thetis, to Dryads and Fauns.

Monti may be considered as the last of a list of writers who form the connecting link between the old and modern literature of Italy. He was the contemporary of Alfieri, Parini, Pindemonte, Foscolo, and, in the latter part of his career, of Manzoni. With these his name will go down to posterity for his truly poetical genius, his feeling of beauty, and the fluency and harmony of his verse.

Monti died at Milan, in October, 1828. His works were

collected and published at Bologna, in 8 vols. 12mo., 1828; and another edition of his choice works, including some inedited ones, was published in 5 vols. 8vo., Milan, 1832.

MONTICULARIA, Lamarck's name for a genus of lamelliferous corals. [MADROPHYLLIÆA.]

MONTLIVALTIA. [MADROPHYLLIÆA.]

MONTMARTRE. [PARIS.]

MONTMEDY. [MEUSE.]

MONTMIRAIL. [MARNE.]

MONTMORENCY, the name of an old and illustrious French family, so called from the little town of the same name situated a few miles north of St. Denis near Paris. The oldest of this family on record is Bouchard de Montmorency, who lived about A.D. 950, and was one of the great feudal lords of his time. He married Hildegarde, daughter of Thibaud count of Chartres and Blois. His son Bouchard II., was one of the principal lords of the court of king Robert about the year 1000. Matthew I., lord of Montmorency, was high constable of France under Louis the Young; he married Aline, a natural daughter of Henry I. of England, and died in 1060. His grandson Matthew II. of Montmorency, was the friend of Louis VIII., and the chief support of his government, and of that of queen Blanche, during the minority of Louis IX. The lord of Montmorency ranked as first baron of France, and was styled first baron of Christendom. The family afterwards became divided into several branches, one of which, though not the eldest, obtained the ducal title from Henri II. of France in 1551. The first who bore the title of duke was Anne de Montmorency, marshal and high constable of France, who distinguished himself in the wars of Francis I., was in great favour with his successor Henri II., but after his death was set aside by Catherine de' Medici and the Guises, was recalled to court in 1560, fought against the Calvinists, was mortally wounded at the battle of St. Denis, in November, 1567, and died three days after, at his house in Paris, at seventy-four years of age. He was a brave but ferocious warrior, was totally illiterate, and yet, through his natural talent and the experience of a long life, he was an able statesman and counsellor. His grandson Henri II., duke of Montmorency, marshal of France, fought with distinction under Louis XIII., but being dissatisfied with Richelieu, he conspired and revolted in Languedoc in favour of the duke of Orleans. He was seized, tried, and beheaded at Toulouse in October, 1632. The house of Montmorency continues to this day in several of its branches, namely the princes of Montmorency, the dukes of Laval Montmorency, and the Montmorency dukes of Luxembourg. (Moréri, *Dictionnaire; Almanach de Gotha.*)

MONTMORILLON. [VIENNE.]

MONTPELLIER, a town in France, capital of the department of Hérault, situated near the little river Les, which flows into the Mediterranean, in 43° 36′ N. lat. and 3° 53′ E. long.; 368 miles in a direct line south by east of Paris; 436 miles by the road through Nevers, Moulins, Clermont, Mende, and Anduze; or 483 miles through Sens, Auxerre, Lyon, Valence, Le Pont St. Esprit, and Nîmes.

Montpellier was built in the tenth century to replace the episcopal town of Maguelone, which stood on an island in a neighbouring lake, and had been destroyed by order of Charles Martel for favouring the Saracens. The town consisted at first of two parts, Montpellier (antiently Montpeslier) properly so called, and Montpellieret, or Montpeslieret: the first was fortified. The two have since grown together, and now form one city. Montpellier had at an early period lords of its own, who distinguished themselves in the crusades and other wars against the Mohammedans in the eleventh and twelfth centuries. In the twelfth century the town was one of the chief commercial stations of France. Benjamin of Tudela (who Hebraizes the name, מונפשליר) thus describes it:—'It is a place well adapted for trade, and is distant about two leagues (פרסאות, which the editor translates 'parasangæ') from the sea. Hither, on account of trade, very many both Christians and Mohammedans resort from every quarter: from Algarve (or perhaps Algier, אלערוה), from Lombardy, and other parts of Italy; from Egypt, and Palestine, and Greece, and France, and Spain, and England; and some may be found there from people of every tongue, together with the Genoese and Pisans.' Benjamin mentions that many learned men (Jews, as their names show) were settled there; and also many wealthy men, who granted aid and protection to those who resorted to them. (Elzevir edit. A.D. 1633.)

The lordship of Montpellier was at this time in the hands of the kings, first of Aragon, and subsequently of Majorca, a younger branch of the same house. These princes held their lordship immediately of the bishops of Maguelone, who divided with them the jurisdiction of the city, under the suzerainty of the kings of France. The portions both of the bishop and the king were alternately united to the French crown; the first in the reign of Philippe IV. le Bel (A.D. 1293), by purchase; the second in the reign of Philippe VI. de Valois (A.D. 1349), also by purchase. The lordship was subsequently conferred on Charles le Mauvais, king of Navarre (A.D. 1371), in exchange for certain lordships ceded by him to the king of France; but on the forfeiture of that king's domains for treason (A.D. 1378), it was re-united to the French crown. A sedition, excited by the severity and exactions of the duke of Anjou, the king's brother and lieutenant, was suppressed (A.D. 1379), and the city, after one brief alienation of fifteen months, was permanently united to the domains of the crown.

In A.D. 1538 the bishopric of Maguelone was transferred to Montpellier. Montpellier came into the hands of the Huguenots in the reign of Henri III., and they, having organised it as a municipal republic, retained possession of it until the crushing of the reformed party by Richelieu, under Louis XIII. Montpellier, after enduring a long siege, surrendered to the king (A.D. 1622). Louis XIII. ordered the construction of a citadel to retain the place in subjection.

Montpellier is situated on an eminence, from which there is an extensive prospect over the Mediterranean and the adjacent coasts, extending on one side to Mont Ventoux, in Provence (not to the Alps, as some authorities state), and on the other to Le Canigou, one of the summits of the Pyrenees. It is only however in very clear weather that these extreme points can be seen. Montpellier is surrounded by antient and now ruined walls of freestone. The citadel is of little strength; it is however well kept up, and has a good parade. The streets are narrow, crooked, and steep; but the houses, which are almost all of stone, are substantially built, though not handsome, except in the newer parts. Most of the places or squares are small and of irregular form; the public fountains are numerous, but none of them are remarkable for propriety of design or excellence of workmanship. There are two promenades, the esplanade between the walls of the town and the ramparts of the citadel, and the Peyrou, a terrace planted with trees and covered with turf, and raised ten or twelve feet above another terrace, forming an exterior walk. On the upper terrace are a bronze equestrian statue of Louis XIV., and an hexagonal tower adorned with columns, enclosing a reservoir supplied with water by a fine modern aqueduct about five miles long. The water from this reservoir falls in a cascade over artificial rocks, and supplies the various fountains of the city. The cathedral presents little that is worthy of notice, except a picture in the choir of the fall of Simon Magus, by Sebastian Bourdon, who was a native of Montpellier. The former amphitheatre of St. Côme, now the Exchange, is adorned with a handsome Corinthian portico, and is perhaps the handsomest building in the city. The modern anatomical theatre is a fine building, and the gate of Peyrou, a triumphal arch opening on the promenade of Peyrou, is also handsome; but the other public buildings, as the former episcopal palace (now occupied as a medical school), the court-house, the prefect's house, &c., are of ordinary appearance.

The population of Montpellier, in 1831, was 33,954 for the town, or 35,825 for the whole commune; in 1836 it was 35,506 for the commune. These enumerations are, we believe, exclusive of the students and other strangers, who are attracted to Montpellier by its literary advantages, or by the high repute which the city enjoys for the beauty of its situation and the healthfulness of its air. The manufactures of the place are considerable, and trade is prosecuted on a large scale. There were, in 1816, eight banking-houses. Liqueurs, perfumery, preserves, dried fruits, verdigris, alum, cream of tartar, vitriol and aquafortis, woollen cloth, muslins, coloured cottons, calicoes, table linen, cotton handkerchiefs, cotton counterpanes, blankets, hosiery of silk, cotton, or wool, hats, leather, corks, and paper, are manufactured; and these various articles, with the wool, wine, brandy, oranges, citrons and other fruits, and oil of the surrounding districts, furnish the chief articles of trade. The verdigris of Montpellier is in

particular repute; it is chiefly made by females. There are several printing-offices, sugar-houses, potteries, and oil-mills, a paper-mill, and a saw-mill. Cette is the port of Montpellier, and there are ready communications with Narbonne, Carcassonne, Nîmes, Avignon, and other cities of the south of France.

Montpellier is the seat of a bishopric, the diocese of which comprehends the department of Hérault: the bishop is a suffragan of the archbishop of Avignon. It has a Cour Royale, the jurisdiction of which extends over the departments of Aude, Aveyron, Hérault, and Pyrénées Orientales, and an Académie Universitaire, whose circuit is coincident with the jurisdiction of the Cour Royale. There are a subordinate court of justice, a court for commercial causes, a board of trade, and several fiscal and administrative government offices. Montpellier is the head-quarters of the ninth military division, which comprehends the departments of Ardèche, Gard, Lozère, Hérault, Tarn, and Aveyron. There are barracks and some military offices, several prisons, a house of correction for eight departments, with suitable workshops, and a charitable institution for the benefit of the prisoners.

There are, besides the cathedral, seven Catholic churches, a Protestant church, and a Jews' synagogue, four hospitals, one of which is for foundlings, and another for the insane. These hospitals, as well as the house of correction, are remarkable for their excellent management. The mont-de-piété is remarkable for advancing money upon pledges without interest. There are two Protestant Bible Societies, one of them for each sex.

Montpellier has a number of institutions for educational and scientific objects. There are the faculties of science and medicine connected with the Académie Universitaire; also a college or high school. The school of medicine of Montpellier, one of the most eminent in Europe, owes its establishment to the Moorish or Arab physicians driven out of Spain by the Christians (A.D. 1180), and received here by the lords of Montpellier. From its first establishment it has been much resorted to. Several eminent physicians and surgeons have been born in this city, and others have here received their education: among the latter are Chirac and Barbeyrac, and the chemist Chaptal. There are attached to this school a library and a museum of natural history, and a collection of anatomical models in wax. The chair of the professor of anatomy is a fine marble antique, brought from the ruins of the amphitheatre at Nîmes. There are special schools of pharmacy and veterinary medicine, schools of engineering, drawing, architecture, practical geometry, and music; societies of the sciences and arts, of practical medicine, and of agriculture; a museum of painting and sculpture, containing some specimens of the first masters. There is a botanic garden, one of the four in France designed for naturalising foreign plants, and the first for that purpose established in France. It contains more than eight thousand plants, an orangery, and a hot-house for tropical plants.

Cambacères and the historian Daru were natives of Montpellier.

Montpellier offers many attractions to strangers; numerous cafés, excellent inns, public baths, and a theatre where the performances are constant; to which may be added the beauty of the situation. The air is purer and less scorching and stifling than at Marseille. Flies are less troublesome, and the keen blasts of the Mistral are less felt.

The arrondissement of Montpellier has an area of 780 square miles, and comprehends 116 communes. It is divided into 14 cantons or districts, each under a justice of the peace. The population, in 1831, was 120,051; in 1836 it was 123,656.

MONTREAL, one of the five districts into which the province of Lower Canada is politically divided. [CANADA.] It comprises nineteen out of the forty counties of the province, and its comparative importance will further appear from the fact that, of 511,917 inhabitants returned in the provincial census of 1831, there were 290,050, or very nearly three-fifths, living in the district of Montreal. Of this number about four-fifths were Roman Catholics, and principally of French origin. The number of inhabited houses existing in the district at that time was 48,323: the extent of land in occupation was about 2,500,000 acres, only one-half of which was then brought under profitable cultivation. The area of the district is 44,711 square miles, upwards of 28 millions of acres, or about 6000 square miles less than the area of England. There has been no account of the population taken since 1831; but calculating from the number of births and deaths, and the amount of emigration during the next five years, it was estimated that the population of the district amounted, in 1836, to 323,173.

MONTREAL, an island in the river St. Lawrence, situated 580 miles from the mouth of that river, at the point of its confluence with the Ottawa. This island is of triangular shape, about 32 miles long and 10¼ miles broad. Its surface is low and flat at the western side, where it is subject to frequent inundations; but the level rises gradually towards the east, till it forms a ridge, whereon the upper part of the city of Montreal is built, at the height of 600 feet above the sea. This island forms one of the nineteen counties into which the district is divided, and is a seigniory, which was formerly vested in the seminary of St. Sulpice at Paris, but is now held by a resident religious body under that name, which supports one of the public institutions of the city of Montreal. The population of the island, in 1831, was 43,773, including 27,297, the inhabitants of the city.

MONTREAL, the City of, second in importance only to Quebec in the province of Lower Canada, is built on the south side of the island, in 45° 31′ N. lat. and 73° 34′ W. long. It was founded in 1640, under the name of Villemarie, on the site of an Indian village called Hochelaga, and very soon came to be a place of some importance. It is now divided into nine parishes; the streets are wide and airy; the principal streets run either parallel to the river or at right angles to it. A great proportion of the houses are large and of handsome elevation, built with a greyish stone; the roofs are all covered with sheet-iron or tin plates. The population is estimated at present to exceed 35,000. One of the streets, Rue Notre Dame, is 1344 yards long and 30 feet wide. In this street are the principal public buildings; among others the Hôtel-Dieu, occupying a frontage of 324 feet, with a depth of 468 feet, the seminary of St. Sulpice, and the convent of Notre Dame. The Catholic cathedral, the English church, the Montreal General Hospital, the *Hôpital Général des Sœurs Grises*, and the new college, are also worthy of notice.

Montreal is a place of great trade. In the year 1836 there entered and cleared from the port the following amount of shipping:

	Inwards.		Outwards.	
	Ships.	Tons.	Ships.	Tons.
From and to Great Britain	73	19,410	68	18,444
From and to other British colonies	23	2,392	31	3,457
From and to the United States of North America	—	—	—	—
From and to Foreign countries . . .	2	487	—	—
	98	22,289	99	21,901

The harbour is small, but while the river continues open, it is always secure. Ships drawing 15 feet water can receive and discharge their cargoes close to the shore. The harbour was formerly difficult of approach, owing to the rapid of St. Mary about a mile below the city, which is so strong, that, with light or contrary winds, it was not possible to stem it; but this difficulty is now overcome by the employment of steam-tug vessels. Montreal was formerly the head-quarters of the North-West Company. [FUR TRADE.]

MONTREUIL. [PAS DE CALAIS.]

MONTROSE. [FORFARSHIRE.]

MONTROSE, JAMES GRAHAM, MARQUIS OF, born in the year 1612, was descended from one of the most antient families in Scotland. His grandfather, John, third earl of Montrose, was some time lord high chancellor of Scotland, and afterwards appointed viceroy of the kingdom—'supremus regni Scotiæ procurator' —for life; and he succeeded his father, John, fourth earl of Montrose, in 1626, being then just fourteen years of age. The following year he was served heir to his father in his several estates in the counties of Dumbarton, Forfar, Linlithgow, Perth, and Stirling. He married soon after, and then went on foreign travel till about 1633, when, at the age of twenty-one, he returned to Scotland, with the reputation of being one of the most accomplished gentlemen of his time. He was probably present at the coronation of King Charles I., which took place in the above year, though he does not appear to have immediately taken any prominent part in the quarrel of which that splendid

ceremonial was the commencement. He soon joined the popular party however in opposing the canons and other arbitrary innovations of the court on the established religion of the country; and on the 15th November, 1637, when the celebrated *Tables* were made up, that is to say, committees for managing the popular cause, his name was added to the table of the nobility, to the great dismay of the bishops, who, according to Guthrie, 'thought it time to prepare for a storm when he engaged.' He was indeed the most ardent and zealous of his party, displaying at times a heat and enthusiasm which set form and gravity at utter defiance. Such was his behaviour on occasion of the king's proclamation approving of the 'Service Book.' On that occasion Montrose stood for some time beside Johnston, while the latter was reading a protestation in name of the Tables, but at length, that he might see the whole crowd, he got up upon the end of a puncheon, which made his friend the earl of Rothes say, 'James, you will never be at rest till you are fairly lifted up above your fellows;' —a remark uttered in mere jest, but recorded with great solemnity by Gordon of Straloch, who adds that the prophecy was 'accomplished in earnest in that same place, and some even say that the same supporters of the scaffold on which it occurred were made use of at Montrose's execution.' In the preparation of the National Covenant, which was projected by the Tables, Montrose was also a leading actor; and in swearing and imposing it on individuals there was none more zealous than he. This course of conduct, springing from the natural ardour of his temper, continued for some time: till at length, conceiving his importance and military talents undervalued by the Covenanters when Argyle and Lesly were allowed to lead, the one in the senate, the other in the field, Montrose determined on going over to the king. With that view he entered into a secret correspondence with Charles, but this being detected, the Covenanters threw him into prison, where he was when Charles made his second visit to Scotland. This took place in the year 1641; and as the principal object of the royal visit was to gain the Scots over to his interest, Charles made various concessions, and Montrose was set at liberty with his adherents in the beginning of the year 1642. From that time he retired to his own house in the country, living privately till the spring of 1643, when the queen returning from Holland, he hasted to wait on her majesty at Burlington, and accompanied her to York. He embraced this opportunity to urge on the queen, as he had formerly done on the king, what he termed the dangerous policy of the Covenanters, and with the impetuosity natural to his character, solicited a commission to raise an army and suppress them by force of arms. The marquis of Hamilton however thwarted him for the present, and he returned home; but neither his ceaseless activity, nor his deadly hatred against the party with whom he had formerly acted, and particularly against their leaders, whose recent imprisonment of him had fired his indignant spirit to revenge, and who filled the place which his ambition had long aimed at, could be laid asleep. Accordingly he took another opportunity of waiting on the king with his proposals on behalf of his majesty, by whom he was favourably received; and at length, in the month of April, 1644, he was created Marquess of Montrose, and constituted captain-general and commander-in-chief of all the forces to be raised in Scotland for the king's service under prince Rupert. The royal arms were for some time unsuccessful however, and the prince seems to have regarded Montrose in no other light than that of a fearless but somewhat wrong-headed enthusiast. Montrose's counsels indeed were almost always of a desperate character, and no failure ever destroyed his confidence of ultimate success. His army was reinforced from all quarters, its attacks were desultory and violent, and its progress was marked by depredation and waste. At Tippermuir, a wide field about five miles from Perth, where Montrose came in sight of the enemy, upwards of 6000 in number, drawn up in one long line, with horse at the flanks, the Covenanters' horse were overpowered, according to Wishart, by a shower of stones. The result was fortunate: the flight of the horse threw the ill-disciplined foot into irremediable confusion, numbers were killed through fatigue and fear, and the whole of the artillery and baggage of the vanquished fell into the hands of Montrose and his men; and the defeat of Tippermuir was but the beginning of a series of conquests, which laid all Scotland open to the victorious Montrose. The last of the series was the battle (or rather, massacre) of Kilsyth, fought in the month of August, 1645. On this occasion Montrose had the advantage of selecting his ground with deliberation, whereas the Covenanters, on the other hand, came up after a toilsome march, and were even ordered to remove from their first position in the very presence of the enemy. While this change was taking place, Montrose cast his eye upon a company of cuirassiers, and, pointing them out to his men as 'cowardly rascals cased in iron,' he threw off his coat and waistcoat, tucked up the sleeves of his shirt, and drawing his sword with ferocious resolution, cried out, 'Let us fight the fellows in our shirts.' The example was instantly copied by the enthusiastic and sanguinary troop, and, falling upon the enemy before they had taken up the places assigned them, the battle which ensued became a mere massacre—a race of 14 miles, in which 6000 of the Covenanters, if we are to believe the royalists, were cut down and slain. Montrose now carried such of his men as would accompany him to the borders, presuming on the continued success of his arms. He was however mistaken: at Philiphaugh, near Selkirk, he was surprised by General Lesly on the 13th September, 1645, and upon the panic-struck royalists was that day inflicted a fearful retaliation for their previous enormities. Montrose regained the Highlands with a few followers, but was perfectly unsuccessful in all his endeavours to excite sympathy towards either his person or cause; and on the king's surrender to the Scots, Montrose capitulated, and was permitted to embark in a small vessel for Norway, on the 3rd September, 1646. On this occasion he put on the disguise of a menial, and passed for the servant of his chaplain. When on the Continent at this time he had the offer of the appointment of general of the Scots in France, lieutenant-general in the French army, and captain of the gens d'armes, with an annual pension besides his pay; but he declined all appointments, saying he wished only to be of service to his own sovereign.

He remained abroad till the accession of King Charles II., when he received a commission for a new invasion of his native country. Accordingly, selecting the remote islands of Orkney for his rendezvous, he despatched thither a part of his troops, consisting of foreign auxiliaries, in the month of September, 1649; and in the month of March following, he himself arrived there. In their very first encounter with the enemy however on the mainland, his forces were utterly routed; and after some time, he himself was discovered on foot in the disguise of a Highland rustic. In this condition he escaped to the house of McLeod of Assint, by whom he was delivered up to General Lesly, and then conducted towards Edinburgh in the same mean garb in which he was taken; but in Dundee a change of raiment was allowed him. His reception in the capital was that of a condemned traitor, sentences of excommunication and forfeiture having been pronounced by the General Assembly and parliament so far back as the year 1644; and many barbarous indignities were heaped upon him. But throughout, his dignity remained undiminished, and he now excited a sympathy which had never before been felt for him. He received sentence of death with the same firmness; and on Tuesday, the 21st May, 1650, the sentence was executed upon him: he was hanged on a gibbet 30 feet high, and his limbs, after being severed from his body, were affixed to the gates of the principal towns in the kingdom. 'Thus perished,' says Laing (*Hist. of Scotland*, b. 6), 'at the age of thirty-eight, the gallant marquis of Montrose, with the reputation of one of the first commanders whom the times had produced. He excelled in military strategems, but his talents were rather those of an active partisan than of a great commander, and were better fitted to excite and manage a desultory war than to direct the complicated operations of a regular campaign. His genius was great and romantic, approaching the most nearly (in the opinion of Cardinal de Retz) to that of the antient heroes of Greece and Rome. But his heroism was wild and extravagant; prone to vast and desperate enterprises, without consulting the necessary means; actuated rather by passion than by virtue, by prejudices rather than by regulated principles; and it was less conspicuous during his life than from the fortitude with which he sustained an ignominious death.' He retained his heroism and self-possession to the last.

On the Restoration, King Charles II. reversed the sentence of forfeiture which had been passed by the parliament; and his scattered remains were collected and buried

with great solemnity in the cathedral church of St. Giles, Edinburgh.

MONTSERRAT, one of the Lesser Antilles, is about 22 miles south-west from Antigua, and about the same distance north-west of Guadaloupe. The island is about 12 miles long from south-east to north-west, and about 7 miles broad.

Montserrat was discovered by Columbus, and received this name from him in consequence of its resemblance to a mountain of the same name near Barcelona, and as being descriptive of its appearance, that of a broken mountain. The first settlement was made on it in 1632, by the English under Sir Thomas Warner. It was taken from the English in 1664 by the French, but was restored at the peace of Breda, and has since continued in the possession of the English. The island is of volcanic origin; the mountains are in many places quite inaccessible, and separated from each other by almost perpendicular chasms, which, with the sides of the mountains, to their summits, are clothed with a luxurious vegetation, including both lofty trees and tropical shrubs. On the south-west side, in a dell formed by the junction of three conical hills, and at a height of 1000 feet from the level of the sea, is a souffrière, or boiling sulphurous spring.

The town of Plymouth is situated on the south-west side of the island, in 16° 42′ N. lat. and 62° 19′ W. long. It is small, but well built. The shipping lies off the town in an open roadstead. There is indeed no harbour or bay on any part of the shore, and it is hazardous for ships to remain at the island during the hurricane months. A heavy surf beats constantly on the shore, and it requires some skill on the part of those who manage the boats to land or embark with safety. For conveying produce and goods to and from the ships, a peculiar kind of boat, called a Moses boat, is used.

The island is esteemed to be so healthy, that it has acquired the name of the Montpellier of the West. The average mortality of the troops stationed there is found to be far less than is experienced in any other of the West India stations.

The population in 1834 was as follows:—

	Males.	Females.	Total.
Whites . . .	140	149	289
Free Blacks . .	412	562	974
Apprenticed negroes .	2,827	3,155	5,982
	3,379	3,866	7,245

Montserrat is a dependency of the island of Antigua, but has a separate legislature of its own, consisting of eight members of the House of Assembly, two of whom are returned from each of the four districts into which the island is divided, and six members of council. The settlers are mostly Irish, or the descendants of Irishmen.

The island produced for exportation in 1836, 11,586 cwt. of sugar, 33,300 gallons of molasses, 17,930 gallons of rum, and 300 lbs. of cotton.

At the distance of about three leagues to the north-west, and between Montserrat and Nevis, is a high, round, barren, and uninhabited rock, to which the name of Redonda has been given; it may be seen at a distance of nine or ten leagues.

MONTUCLA, JEAN ETIENNE, was the son of a merchant at Lyon, in which city he was born, 5th September, 1725. At the age of sixteen he became an orphan, and his grandmother, who had been left guardian of his education, died shortly afterwards. At the Jesuits' College of Lyon his attention was chiefly directed to the study of the antient classics, although a decided taste for philological pursuits in general, assisted by a peculiarly retentive memory, enabled him to become acquainted with several of the modern languages, among which the Italian, English, Dutch, and German are mentioned as those with which he was more particularly conversant. At this college also, under Le Père Béraud, the subsequent tutor of Lalande, he attained to considerable proficiency in those sciences of which he was afterwards the historian.

From Lyon he went to Toulouse, in order to qualify himself for the legal profession, and having taken the usual degrees, he thence proceeded to Paris.

At the public libraries of that metropolis, and at the scientific soirées of M. Jombert, he made the acquaintance of Diderot, D'Alembert, Cochin, Lalande, and others. To his intercourse with D'Alembert in particular, he probably owed much of his mathematical knowledge; and Lalande, if he did not suggest a history of the mathematical sciences, at least gave him considerable encouragement to carry out the design when once it had been formed. In 1754 he published in 12mo. anonymously, the 'History of the Researches for determining the Quadrature of the Circle,' to which was appended 'An Account of the Problems of the Duplication of the Cube, and the Trisection of an Angle.' A second edition of this work appeared in 1831, in 8vo., edited by Lacroix. The following year (1755) he was admitted a member of the Academy of Berlin; and in 1758 he published, in two volumes 4to., the first part of the 'History of the Mathematics.' After this he began to be employed by the government; first, as intendant-secretary at Grenoble, where he became acquainted with the family of M. Romand, whose daughter he married in 1763; and then (1764), as secretary and astronomer royal to the expedition for colonising Cayenne. Upon his return to France the following year, he obtained, through the instrumentality of his friend Cochin, the situation of 'premier commis des bâtiments,' the duties of which he discharged most assiduously for twenty-five years. To the above appointment was added the honorary one of censor royal of mathematical books. His leisure was devoted to the education of his family and to scientific pursuits, but the latter he is said to have conducted with extreme secrecy, lest he should be suspected of neglecting his official duties. In this way he edited, in 1778, a new and greatly improved edition of Ozanam's 'Mathematical Recreations,' in 4 vols. 8vo., and so carefully had he concealed his connection with the work, that a copy was forwarded to him, in his capacity of censor, for examination and approval. The income he derived from his situation under the government, though small, was sufficient for the immediate wants of himself and family, but by the events of the Revolution he lost his situation, and was left little short of destitute.

In 1794 he was employed in forming an analysis of the treaties deposited in the archives of the foreign department, and about the same time he was nominated professor of mathematics to one of the central schools of Paris, but his health not permitting him to fill the appointment, a situation in the 'Jurés d'Instruction' was assigned to him. In 1798 he published a second edition of the first part of his 'History of the Mathematics,' in which he introduced many improvements and augmentations. With the exception however of the profits, if any, which he may have derived from this work, his only resource for two years, from which he could provide for his family, was an insignificant situation in the office of the National Lottery. Upon the death of Saussure, in 1799, the minister Neufchâteau conferred upon him a pension of 2400 francs, which he lived but four months to enjoy. He died on the 18th of December, 1799. His modesty and benevolence were no less conspicuous than his erudition and the smallness of his fortune. When Lalande, deputed by the Academy, offered him some situation in that society, he declined the honour on the ground of incompetency.

Before his decease he had occupied himself with the second part of his History. The completion of the work was confided to Lalande, who, with the assistance of several scientific individuals, among whom was Lacroix, published the remaining two volumes in 1802. The whole work is divided into five parts, and these are subdivided into books and chapters. Part I. contains the History of the Mathematics up to the destruction of the Grecian empire. Part II. comprises the History of the Sciences among the Arabs, Persians, Jews, Indians, Chinese, and other Oriental nations. Part III. contains the History of the Sciences among the Latins and the Western nations up to the commencement of the seventeenth century. These three parts form the first volume. Part IV., forming the second volume, and comprehending the History of the Sciences during the Seventeenth Century, is divided into nine books, namely, 1, Progress of Geometry, as treated after the manner of the Antients; 2, Progress of Analytical Geometry; 3, Progress of Mechanics about the middle of the Seventeenth Century; 4, Progress of Optics about the middle of the Seventeenth Century; 5, Progress of Astronomy during the Seventeenth Century; 6, Rise and Progress of the Differential and Integral Calculus in the latter part of the Seventeenth Century; 7, Progress of Mechanics during the same period, 8, Progress of Optics during the same period; 9, Progress of Astronomy during the same period. The remaining two

volumes form the fifth part. It comprises the History of the Sciences during the greater part of the Eighteenth Century, and is likewise divided into nine books, namely, 1, Geometry and Analysis; 2, Optics; 3, Analytical Mechanics; 4, Practical Mechanics and Machines; 5, Plane Astronomy; 6, Physical Astronomy; 7, Astronomical Tables, Instruments, Observatories, &c., and Judicial Astrology; 8, Progress of Navigation, as regards the Construction and Management of Vessels; 9, Progress of Navigation as regards the Piloting of a Vessel and the determination of its Geographical Position. The work concludes with a series of supplements on the Capstan; on the History of Geography; on that of the Quadrature of the Circle; on the History of Music; a defense of the Philosophers of Antiquity; Notice concerning the Calculus of Derivations by Arbogast; and a short notice of the Life of Montucla.

As a whole it contains treatises upon almost every branch of the pure and applied sciences, and abounds with interesting details concerning the various discoveries and improvements which have contributed to their progress. Bonnycastle, speaking of Montucla, in his preface to the translation of Bossut's 'History of the Mathematics,' justly remarks—'If he be not so profound as some other writers, he is frequently less obscure, and may often be consulted with advantage upon points where the original writers would be nearly unintelligible to common readers; in short, there is perhaps no work which is capable of affording more pleasure and instruction to those who propose to devote themselves to those studies, or which is likely to create a more earnest desire to prosecute them.' On the other hand it may be said that the subjects treated of do not succeed each other in so elementary and natural an order as might be wished, and that the language is sometimes excessively diffuse, and burthened with much repetition.

(*Notice Historique lue par Auguste-Savinière le Blond à la Société de Versailles, le* 15 *Janvier*, 1800, 8vo.; *Biog. Universelle;* Hutton's *Mathematical Dictionary*, &c.)

MONZA. [MILANO, PROVINCE OF.]

MOOD, or MODE. [VERB.]

MOOLTAN. [HINDUSTAN, vol. xii., p. 221.]

MOON (Latin *Luna*, Greek σελήνη, sĕlēnē), the satellite of the earth, a heavenly body which moves round the earth, sharing the motion of the earth round the sun.

In a day or two (depending on the state of the weather) from the time called in the almanacs 'the new moon' a thin silver crescent is seen with its horns turned from the sun and placed to the eastward of the sun, after which it soon sets. Its distance from the sun increases, the horns at the same time growing fuller, until, in 7¼ days, it is at ninety degrees (or as far as from the horizon to the zenith) distant from the sun, and the crescent has become a semicircle of white light. The distance still increases, until the moon is 180° distant from the sun, or in the opposite part of the heavens, by which time the light part has become a full circle: this happens in somewhat more than 14½ days from the new moon. The satellite still continues its revolution among the stars, becoming westward of the sun after the full moon, and, decreasing by the same steps as it increased, is lost a day or two before the time which the almanacs point out as the next new moon. The whole of this process takes up what is called a *lunation*, or a *lunar month:* the lunar months are slightly unequal, but their average period is 29 days, 12 hours, 44 minutes, $2\frac{9}{10}$ seconds, or 29·5305887215 mean solar days. To show the irregularity of the lunations, we give the times of all the new moons which take place in the years 1838 and 1839, with the intervals.

1838.	h. m.	Excess of Interval over 29 days. h. m.	1839.	h. m.	Excess of Interval over 29 days. h. m.
Jan. 26	1 52 A.M.		Jan. 15	2 53 P.M.	14 30
Feb. 24	0 8 P.M.	10 16	Feb. 14	3 28 A.M.	12 35
Mar. 25	9 45 P.M.	9 37	Mar. 15	2 13 P.M.	10 45
Apr. 24	7 1 A.M.	9 16	Apr. 13	11 18 P.M.	9 5
May 23	4 23 P.M.	9 22	May 13	7 10 A.M.	7 52
June 22	2 34 A.M.	10 11	June 11	2 42 P.M.	7 32
July 21	2 22 P.M.	11 48	July 10	11 1 P.M.	8 19
Aug. 20	4 26 A.M.	14 4	Aug. 9	9 19 A.M.	10 18
Sept. 18	8 45 P.M.	16 19	Sept. 7	10 21 P.M.	13 2
Oct. 18	2 25 P.M.	17 40	Oct. 7	2 13 P.M.	15 52
Nov. 17	8 2 A.M.	17 37	Nov. 6	8 11 A.M.	17 58
Dec. 17	0 23 A.M.	16 21	Dec. 6	3 1 A.M.	18 50

It appears then not only that the lunar month varies, but that there is no yearly cycle of variation. Before however we make any remark on the proceding, we shall place by its side materials for confidence in the almanac from whence the preceding times were quoted. Taking at hazard a volume of astronomical observations, and opening the part where the results of the lunar observations are found, we took the first right ascensions [ASCENSIONS] of the moon which we came to, opposite to which, for comparison, were written the predicted right ascensions of the moon for the same times. The dates matter nothing, since it is only the accordance of prediction with observation which is to be noticed. (*Camb. Obs.*, 1835, p. 128.)

Predicted R.A. h. m. s.	Observed R.A. h. m. s.	Difference.
14 23 57·87	14 23 57·61	26-100ths of a second.
23 1 59·84	23 1 58·55	1ˢ and 29-100ths.
4 56 13·31	4 56 14·01	7-10ths of a second.
18 7 40·74	18 7 40·50	24-100ths of a second.

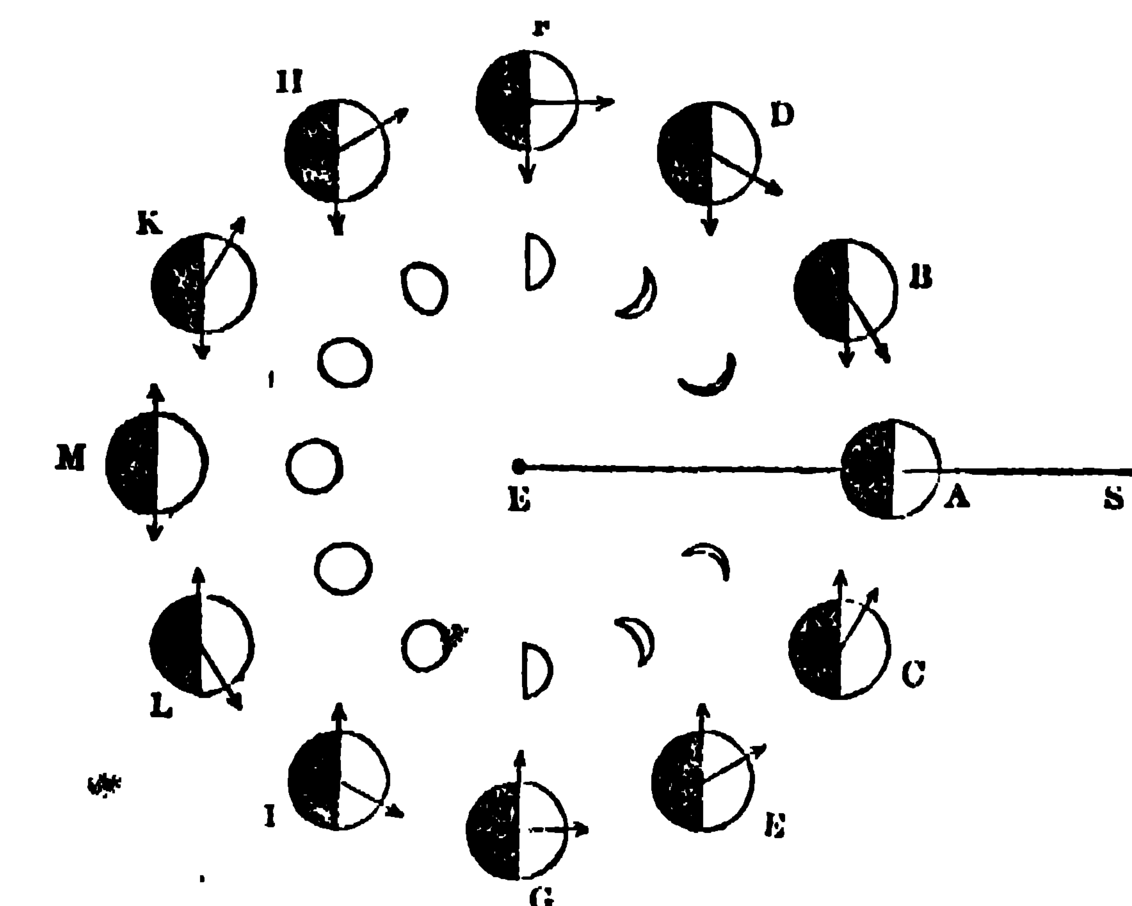
The lunar theory then, resting upon the Newtonian doctrine, enables astronomers to find the position of the moon within a part of the heavens answering to a second of diurnal revolution, while the rough observations with which astronomy must always commence would not give the length of a lunation within an hour.

Taking the lunar phenomena in the order of discovery, we next notice that this planet writes its mark on the earth in terms which have been understood from the earliest ages of astronomical inquiry. The alternate rise and fall of the waters, called the *tides*, is found to follow its motions, so that high water is always found to succeed the time when the moon comes on the meridian, whether on the visible or invisible side of it. At first sight it would appear that there is high water twice a-day (that is, in the common solar day), but it is found on further examination that the interval between high water and high water is a little more than twelve hours; so that in the year 1838 that phenomenon occurred only 705 instead of 730 (twice 365) times. Now the motion of the moon round the heavens is found, to take place (one time with another) in 27·32166142 solar days (we shall presently see why this is not a lunation), which gives 13° 10′ 35″ increase of right ascension in each solar day, or 13° 8′ 23″ in a sidereal day, or actual revolution of the earth. Hence the meridian of the spectator, between two times at which the moon is on the visible side of that meridian, must make so much more revolution as is necessary to overtake a body which revolves through 13° 8′ 23″ while it revolves through 360°; which gives $24^h\ 55^m$ of a revolution of the earth for each lunar day, or $12^h\ 27\frac{1}{2}^m$ for its half. Now the year contains 366¼ *sidereal* days, or simple revolutions of the earth; and it will be found that $12^h\ 27\frac{1}{2}^m$ is contained 705 times and a a fraction in $366\frac{1}{4}^d$. As every reader may not be acquainted with the distinction of sidereal and solar time, we may here simply state (referring to SUN and TIME for detail) that the common day is not the simple revolution of the earth, but includes the additional time in which the meridian overtakes the sun, which has moved forward about a degree. Thus it appears, that even on a single year the coincidence of half a lunar day and the interval between two times of high water is sufficiently apparent. It may be said that we have assumed the question by counting the times of high water from an almanac constructed on the supposition which we wished to establish. This would be true if we had talked of the year 1840; but we may consider an almanac for 1838 as now a verified prediction: it would have made no small noise in the public papers if there had been a tide more or less in the Thames than was predicted in the almanacs. The theory of the tides is the most difficult in astronomy, owing to the disturbing action of winds, channels, &c., as well as its intrinsic* mathematical difficulties; but this one phenomenon has never had its exception in open sea—that every transit of the moon over (either side of) the meridian is followed by the rise of the water, though so high a wind has been known as to prevent the tide coming up a river.

We return to the phenomena of the *phases* (Greek for appearances), as they are called, of the moon, namely, the changes in the quantity of its illuminated part. These may be immediately explained on the supposition that the moon is not luminous itself, but receives its light from the sun.

* The reader is referred to Mr. Lubbock's lately published treatise on the tides for proof of the rapid progress which the minute accordance of prediction and observation is making.

To show how this may be, suppose a ball, illuminated by another ball at a great distance in the direction ES, to be carried round the spectator at E. This ball may be always subdi-



vided into a visible and invisible half, since one-half must hide the other in all positions. But it may also be divided into an illuminated and unilluminated half. At A the visible half is all unilluminated, and though we have called it the visible half (meaning in a position to be seen, if there were light), it will not be seen. But when the ball arrives at B, a small portion of the illuminated half is in the visible half, as much as is intercepted between the arrows. At D a larger portion of the illuminated part is visible, and at E a full half of the visible surface is illuminated. A little consideration of this scheme (which is moreover explained in all popular works) will show not only the occurrence of phases precisely similar to those of the moon, but also that the circular boundary of the enlightened part is towards the illuminating body. We copy from Riccioli his collection of the Latin and Greek terms used with respect to the different phases:

A Novilunium, luna silens, Conjunctio, Congressus cum sole, Neomenia, Synodus, Lunæ accensio.	νεομηνία, νουμηνία, σύνοδος
B Prima phasis, Nova luna.	πρώτη φάσις, νέα σελήνη
C Ultima phasis.	ἐσχάτη φάσις, ἕνη σελήνη
Luna novissima, Interlunium, seu intermenstruum, est tempus inter ultimam et primam phasim, à C ad B.	ἀφανισμὸς
B, C, D, E, Corniculata, Falcata, curvata in cornua.	μηνοειδὴς
D Primus sextilis aspectus, et E secundus.	ἑξαγώνος
F Prima Quadratura, G secunda; luna dividua, bisecta, dimidiata, semiplena.	τετράγωνος, διχότομος, ἡμίτομος
H, K, L, I, Luna Gibba, gibbosa; H primus, I secundus aspectus trinus; Luna in triquetro.	ἀμφίκυρτος, τρίγωνος
M Plenilunium, Oppositio, Luna Totilunis, in diametro sinuata in orbem, medius mensis.	πανσέληνος, διχομηνία
Luna crescens ab A per F in M, Luna descrescens seu senescens ab M per G in A.	σελήνη αὐξανομένη, σελήνη φθίνουσα

If the moon moved in the plane of the ecliptic, or of the sun's motion, as in the figure, there would be an eclipse of the sun at every new moon (A), and of the moon at every full moon (M); since in the former case the moon would hide the sun, and in the latter the earth would intercept the sun's light. The moon however is generally a little on one side or the other of the ecliptic, not enough to introduce any sensible error into the preceding explanation of the phases, but enough to hinder the eclipses from taking place, except now and then: we shall see more of this presently. Again, if the sun remained in the line E S, the lunation, or complete cycle of phases, would be of the same duration as the actual revolution of the moon round the heavens Since however the sun moves slowly forward in the same direction as the moon, the latter does not alter its phases so rapidly as in the figure, nor is the cycle of phases complete until the moon has overtaken the sun.

It is usual to divide the whole lunation into four quarters, the first from new moon to increasing half moon, the second from half moon to full moon, the third from full moon to waning half moon, the fourth from half moon to new moon. Each of these is called the change of the moon, and it is a very common belief that a change of weather and wind is to be expected, if not at every change of the moon, at least much oftener at the changes than in the intervals. This opinion, when not absolutely received as true, is usually treated as the extreme of absurdity. It is in truth neither one thing nor the other, as the following considerations will show.

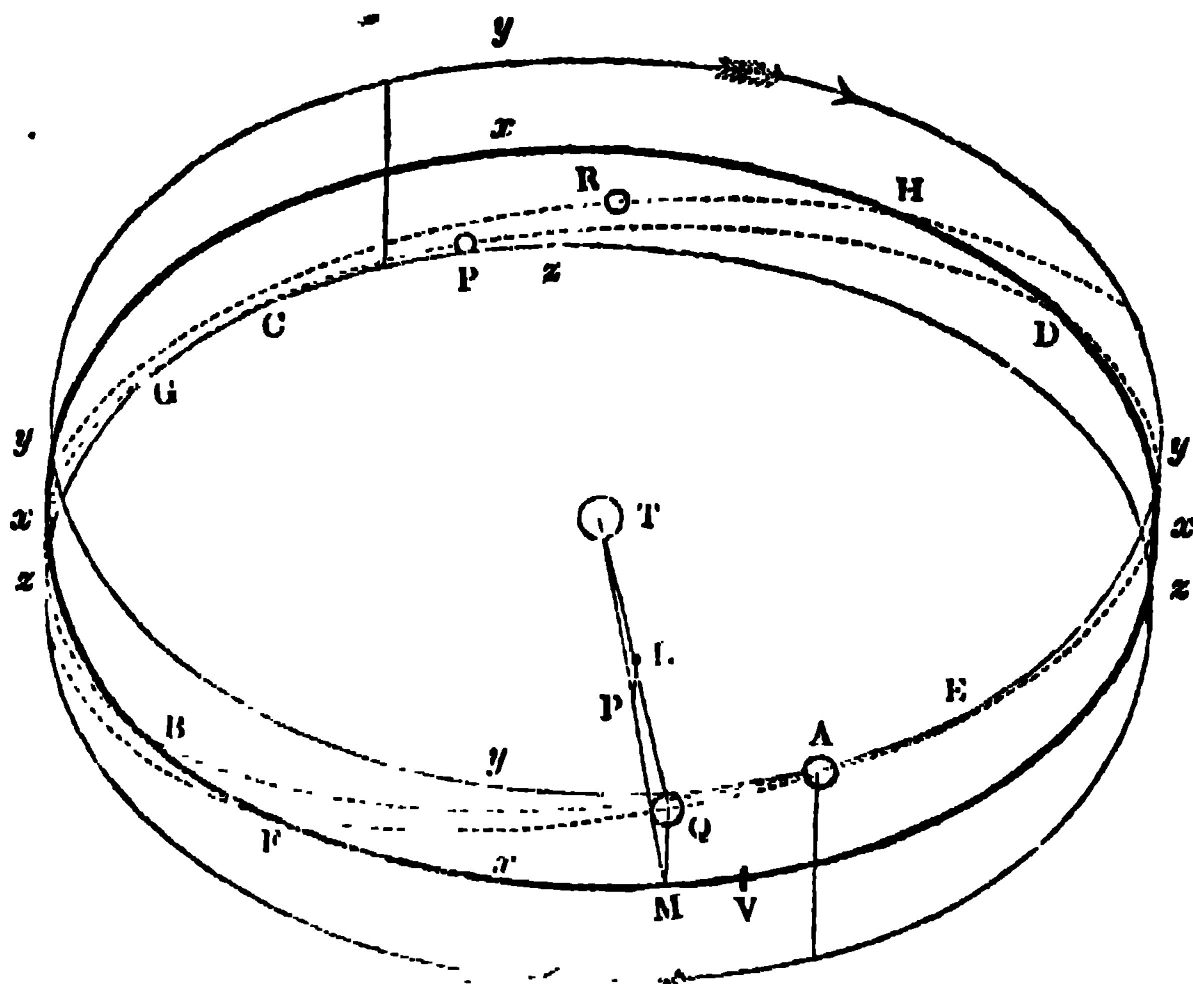
The atmosphere is continually undergoing a slight alteration from the effects of the tide. At new and full moon (or rather a little after these phenomena) there are those great tides called the spring-tides, arising from the action of both luminaries: at the two quarters the same luminaries oppose each other, and the quarters are followed by the smaller floods, called neap-tides. What effect may be produced by this succession of smaller and greater oscillations of the sea, which must produce oscillations of the atmosphere, it is impossible to say beforehand. Again, we know nothing of the electric action of either luminary upon the earth, or whether any and what electric state may depend upon their relative position. We have therefore abundant grounds *à priori* to abstain from forming any opinion upon the effect of the heavenly bodies upon the weather; and we shall now state the results of such facts as observation has furnished. A few years ago M. Arago collected the evidence on this subject in an article published in the 'Annuaire:' the general conclusion derived from them is, that upon the whole there is *a little* more rain during the second quarter than during either of the others; but that there is no reason to confirm the common notion that a change of the moon is accompanied by change of weather It has also been observed that the height of the barometer is, one time with another, less in the middle of the second quarter than in that of either of the others; and that it is somewhat greater at new and full moon than at the quarters. With regard to a great many other asserted effects of the moon upon animal and vegetable life, it can only be said that there is no conclusive evidence for or against them; nothing but a long series of observations can settle such points, and this is not likely to be made (or if made, to be made fairly) by those who have predetermined the questions in one way or the other. For an account of M. Arago's paper, see the *Penny Magazine*, Nos. 82 and 84.

The moon's age is usually reckoned from the new moon, and the rules by which Easter is found depend, or should depend, upon a correct knowledge of this age at the beginning of the year, called the EPACT. But all readers should remember that the sun and moon by which Easter is found are not the real bodies, but fictitious ones, moving not with the real but the average motions, and therefore sometimes before and sometimes behind the real bodies. It should then be no matter of surprise if, as will happen, Easter-Sunday should sometimes be seven days sooner or later than it would be if the real bodies were employed. [EASTER.]

We now come to the actual motion of the moon round the earth, which is the most complicated question in astronomy. Roughly speaking, it may be said that the moon's motion is circular, which is sufficient for the explanation of the phases; it is somewhat, but very little, more correct to say it is elliptical. If the moon's orbit were actually exhibited in space, an ellipse might be found which would nearly fit one of its convolutions; but the succeeding convolutions would depart further and further from such an ellipse, and it would be nineteen years before a convolution would again occur which is situated in space near to the ellipse with which we started. And though astronomers have found a way of simplifying the question, by supposing the moon to move in an ellipse which itself moves in space, yet we may better explain the subject by arriving at that ellipse from the real motion than by beginning with it.

When the motion of the moon is watched in the heavens with instruments fitted to measure her apparent diameter, it is soon found that she changes her distance from the

earth, becoming alternately larger and smaller. Her path is not very much inclined to the ecliptic, so that she is never 5¼° from some one of the positions which the sun has had or will have in the course of the year. We may explain the *apparent* path in the heavens by the following figure,



which represents a portion of the apparent heavens. T is the earth in the centre, *xxxx* is the circle of the ecliptic; *yyyy* and *zzzz* are small circles parallel to the ecliptic, and each distant from it in the heavens by an angle of 5° 8′ 47″·9. The moon may rise 8′ 47″·15 above *xxxx*, or fall as much below *zzzz*; but these two circles are chosen because they are *means*, that is to say, for every convolution which rises above *xxxx* there will be another, described at some other time, at which it falls short of *xxxx*; so that in a long series of years the sum of all the arcs by which convolutions rise above *xxxx* would be equal to the sum of those arcs by which other convolutions do not attain *xxxx*. The angle 5° 8′ 47″·9 is, in the astronomer's elliptic fiction, the mean inclination of the orbit to the plane of the ecliptic. The dotted line A B C D E F G H is one complete convolution of the orbit and the greater part of another. We suppose the moon to set off from its highest point (high and low have reference to the ecliptic) A, at or very near *yyyy*: from thence it falls to the descending node B, and continues to descend to its lowest point C, from whence it rises to the ascending node D, and from thence ascends to E, from thence to the next descending node F, from thence to G, the lowest point (at or near *zzzz*), and to the next ascending node H, &c. In this way the whole of the lunar zodiac is interlaced with the convolutions of its orbit, which go on for ever; nor have we any reason to suppose that the cycle of convolutions is ever complete, so as to begin again.

The first thing we have to notice is what is called the regressive motion [Motion] of the nodes. The first node we meet with is B, and the next, D, is not exactly opposite to B, but a little behind the opposite point; the next, F, is still more behind B. The words before and behind have reference to the direction of the motion. This recession of the node amounts, one year of 365 days with another, to 19° 19′ 42″·316, and the node makes a complete retrograde revolution in 6793·39108 mean solar days, or 18·6 years nearly. The point in which the moon ascends through the ecliptic falls back more than twice the moon's diameter in each revolution. The amount however is subject to some variation; that given above is its average.

Again, the apparent diameter of the moon is observed to vary, owing to an alteration of her distance from the earth. When least it is 29′ 2″·91; when greatest 33′ 31″·07. But it is observed that the least and greatest diameters of a single revolution are not exactly the same as those of another revolution; and also that the place where the diameter is least is not exactly opposite to that in which it is greatest, but always in advance. Thus the diameter, being greatest at A, becomes least at P, in advance of the point opposite to A, greatest again at Q (in advance of A), and least again at R. Now the apparent diameter must be least when the distance is greatest, and *vice versâ*; the point of a convolution most distant from the earth is called the apo-gee, that nearest to the earth the peri-gee. There is then a progression of the apogee, and its average quantity is no less than 6′ 41″ for each solar day, or 40° 39′ 45″·36 in 365 days; which is equivalent to a complete revolution in 3232·575343 mean solar days, or about nine years. The quantities above given are averages, for the actual progression is irregular.

We may notice then five distinct species of months—1. The average sidereal month, or complete circuit of the heavens. 2. The average lunation, common month, or interval between two conjunctions with the sun. 3. The average *anomalistic* month, or revolution from perigee to perigee. 4. The average tropical month, or from the vernal equinox to the vernal equinox again (the equinox being in retrograde motion [Precession]). 5. The average nodical month, or from a node to a node of the same kind. The quantities of these months are as follows (Baily, *Astron. Tables and Formulæ*) in mean solar days:—

	d.	h.	m.	s.		d.
Sidereal month	27	7	43	11·5	or	27·32166142
Lunation .	29	12	44	2·9	„	29·53058872
Anomalistic month	27	13	18	37·4	„	27·55459950
Tropical month	27	7	43	4·7	„	27·32158242
Nodical month	27	5	5	36·0	„	27·21222222

If we compare the lunation with the common year, we shall find that 235 lunations make 6939·69 days, while 19 years make 6939 or 6940 days, according as there are four or five leap-years in the number. Neither is wrong by a day; consequently in 19 years the new and full moons are restored to the same days of the year. This does not absolutely follow, either from the preceding or from the method which gave it, since neither is the coincidence exact, nor are the months exactly equal. But it will generally so happen; and this is the foundation of the Metonic Cycle. [See also Calippus.] Again, 223 lunations make 6585·322 days, and 242 nodical revolutions make 6585·367 days, so that there is only ·035 of a day, or 50 minutes difference between the two. This period of 223 lunations is the Saros, a celebrated Chaldean period, and contains in round numbers of days 18 years and 10 days, or 18 years and 11 days, according as there are five or four leap-years. It may be worth while to express these numbers of lunations in terms of the other months.

Metonic Cycle.—235 lunations make 253·999 sidereal months, 251·852 anomalistic months, and 255·021 nodical months.

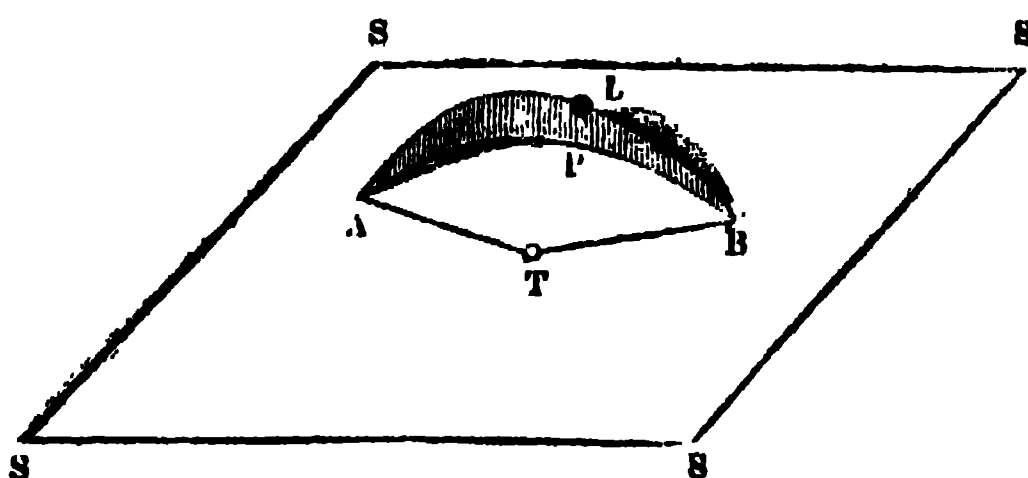
Saros.—223 lunations make 241·029 sidereal months, 238·992 anomalistic months, and 241·999 nodical months.

The rate at which the moon moves is different in different parts of the orbit. We may speak either of the rate at which she changes longitude, latitude, or distance from the earth; and owing to the smallness of the *inclination of her* path to the ecliptic, her motion in longitude is nearly the same thing as her motion in her own orbit. The quickest motion is at or near the perigee, and the slowest at or near the apogee. The moon's rate of motion follows no easily obtainable law in its changes, which are different in different months. The rate of change of latitude is greatest near the nodes, and the rate of change of distance from the earth is least at the apogee and perigee, and greatest at and about the intermediate points. We have hitherto considered the apparent path of the moon among the stars: we now pass to the real orbit in space. Her average distance from the earth is 29·982175 times the equatorial diameter of the earth, which makes about 60 radii of the earth, or 237,000 miles. But the radius of the sun's body is 111½ times the radius of the earth; so that a large sphere, which, having its centre in the earth, should contain every part of the moon's orbit, would not be a quarter of the size of the sun.

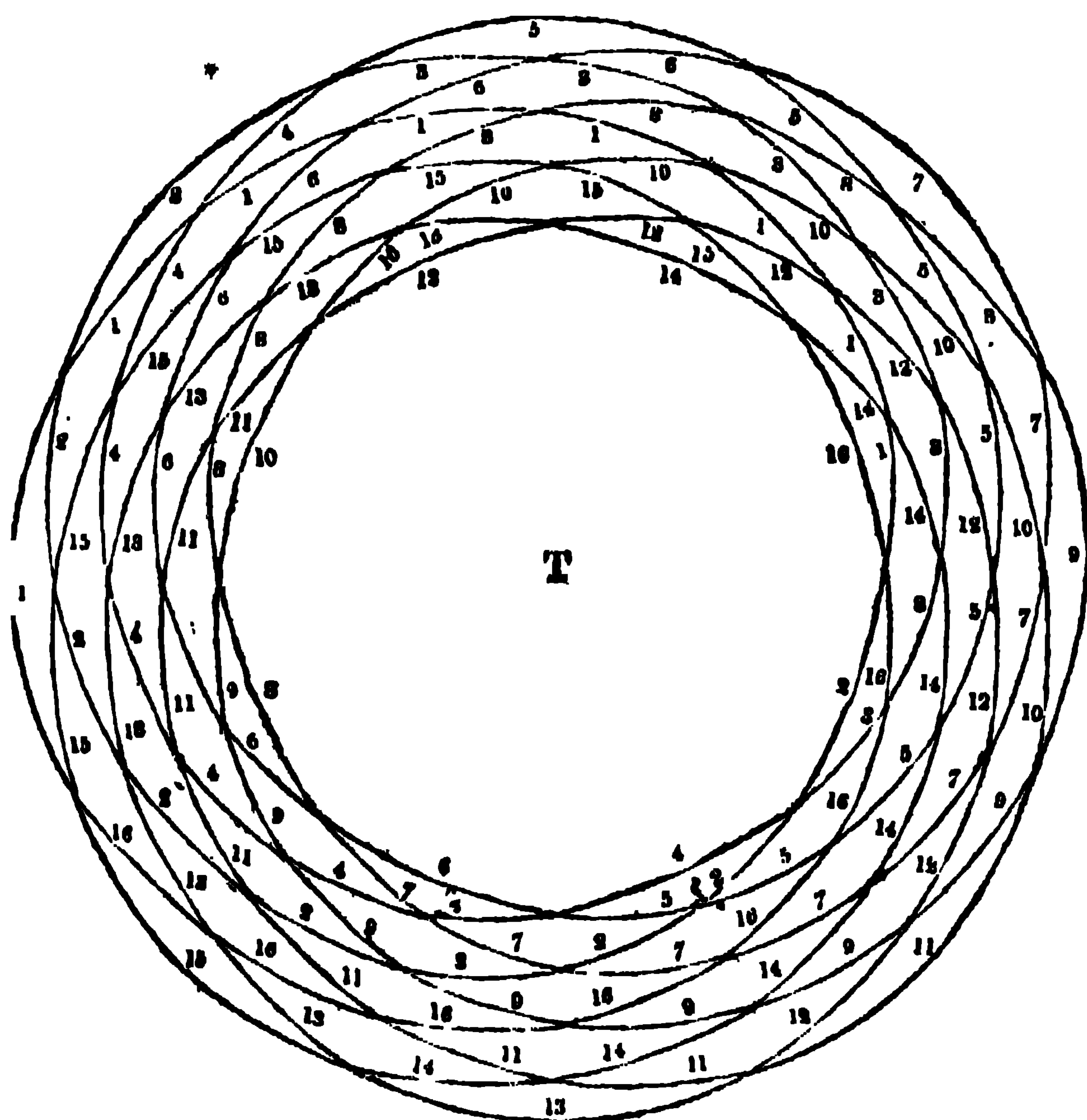
Again, the sun's distance is 23,984 radii of the earth, or nearly 400 times the moon's average distance. A good idea of the relative magnitudes of the distances may be obtained as follows:—Take a ball one inch in diameter, to be the sun, and another of one half an inch in diameter to be the sphere which envelops the moon's real orbit; place these nine feet apart, and a proper idea of the distance of the sun, compared with its size and that of the moon's orbit, will be obtained.

To form a sufficient notion of the real orbit, imagine another body, directly under the moon on the plane of the ecliptic, to accompany her in her motion. Let S S S S represent the plane of the ecliptic, in which the sun must

be, and A L B a part of the real orbit, from an ascending to a descending node; L being a position of the moon, P is the projected body on the plane of the ecliptic; and the



motion of P will be very nearly that of L, owing to the smallness of the rise of A L B above the plane of the ecliptic. The motion of the projected body will then be of the kind of which the following is an exaggeration.



Suppose the moon to set out from 1 on the left, being then in apogee, and also at a node: the projected body will then describe 1 1 1, &c., until it comes to its perigee at the first 2, which is in advance of the point opposite to the apogee. But the real moon will have come to the plane of the ecliptic before it is opposite to the first 1, so that at the first 2 the moon will be below the projected orbit. The projected body then describes 2 2 2... up to the next apogee 3, and so on; the real moon having come above the ecliptic before the last 2 but one. In the present figure the number of folds is limited, and the last joins the first; in the moon's orbit the number of folds is unlimited. The real relation between the greatest and least distances is slightly variable in the different folds; one with another it may be thus stated: $5\frac{1}{2}$ per cent. being added to the mean distance will give the greatest or apogean distance, and subtracted, the least or perigean distance. Taking the fiction of the moving ellipse for the moon's orbit, its eccentricity is ·0548442.

In the article GRAVITATION will be found a sketch of the producing causes of the inequality of the lunar motions, showing that they arise from the effect of the sun's unequal attraction of the earth and moon; were it not for which, the latter would describe an ellipse round the former. In the present article we intend only to describe the motions themselves. We have pointed out both the apparent orbit in the heavens, and the real orbit: it remains to ask, In which manner is the real orbit described? At a given time, how is the moon's place in the heavens to be ascertained?

Returning again to the apparent orbit, we first consider motion in longitude only; that is, we ask how to find the moon's longitude at the end of a given time. Let us suppose then that, Q being the apparent place of the moon in the heavens, we draw Q M on the sphere perpendicular to the ecliptic, so that M has the same longitude as Q. To connect this figure with the last, suppose that the moon was at L when it was projected in the heavens to Q, and let P be the projection of L on the ecliptic: then P will be thrown upon M in the heavens. The average motion of M will be that of the moon, or a circuit in 27·32166 days. If then we were to suppose a fictitious moon setting out from M, and moving with this average motion, it would never be far from the point M; which last, from the irregularity of the real moon's motion, would be sometimes before and sometimes behind the fictitious moon.

If we could observe the fictitious moon, thus regularly moving in the ecliptic (say every day at midnight), and also the real moon, we might take a long series of years' observations, and sum all the excesses of M's longitude over that of the fictitious body, when there are excesses, and all the defects, when there are defects. We might expect to find the one sum equal to the other; but we are taught by the theory (which, as before seen, is exact enough to find the moon's place within a second) that the equality of these sums will not be absolutely attained in any series of years, however great, if we take the commencing point, at which M is to coincide with the fictitious body, at our own caprice. Wherever Q may be, there is a proper place for this fictitious moon, before or behind M, from which if we allow the former to start, the longer we go on with the series of supposed observations, the more nearly will the excesses balance the defects; supposing always that our series of observations stops at the end of a complete number of circuits, and not in the middle of one. This position is called the *mean place* of the moon, as distinguished from Q, its *real place*. Let us suppose it to be at V; then if the average moon start from V, with the moon's average motion, it will at every instant of time point out what is called the mean place of the moon corresponding to the then real place. At the commencement of the present century, that is, when it was 12 o'clock at Greenwich on the night of December 31, 1800, the longitude of the average moon, or the moon's mean longitude, was (according to Burckhardt) $118^\circ\ 17'\ 3''$; and the mean longitude at any other time is found by adding in the proportion of $4809^\circ{\cdot}38468$ for every 365 days, and making the necessary additive allowance for the precession of the equinoxes. [PRECESSION.]

In the same way the node and perigee of the moon have their mean places, and, as we have seen, their mean motions. The mean longitude of the perigee, at the commencement of the century, was $266^\circ\ 10'\ 7''{\cdot}5$; that of the ascending node $13^\circ\ 53'\ 22''{\cdot}2$.

To the above must be added that these average motions, as they are called, are subject to a slight acceleration, which hardly shows itself in a century: that of the longitude was detected by Halley from the comparison of some Chaldean eclipses with those of modern times. This acceleration would, in a century, increase the mean longitude of the moon by $11''$, that of the perigee by $50''$, and that of the ascending node by $7''$.

The mean longitude being ascertained for the given time, the true longitude is found by applying a large number of corrections, as they are called, some determined from the theory of gravitation, but the larger ones, as might be supposed, detected by observation before that theory was discovered, and since confirmed by it. Into this subject it will be impossible to enter at length; we shall therefore merely instance a few of the principal corrections for the longitude, observing that the latitude, the distance, &c. are all determined by adding or subtracting a number of corrections from the results of the supposition that the moon moves uniformly in the ecliptic at her average distance from the earth.

The first correction is one which brings the motion nearer to an elliptical one, and is called the *equation of the centre*. It depends upon the moon's distance from her perigee, called the anomaly. The *mean* anomaly is the distance of the moon's mean place from that of the perigee. The mathematical expression is (we give only rough constants),

$$6^\circ\ 17' \times \sin\ (\text{mean anomaly}).$$

The second correction, known as the *evection*, and discovered by Ptolemy, is,

$$1^\circ\ 16' \times \sin\ \{2\ (☾ - ☉) - \text{mean anomaly},\}$$

where ☾ and ☉ stand for the mean longitudes of the moon and sun.

The *variation* and the *annual* equation (discovered by Tycho Brahé) are represented by

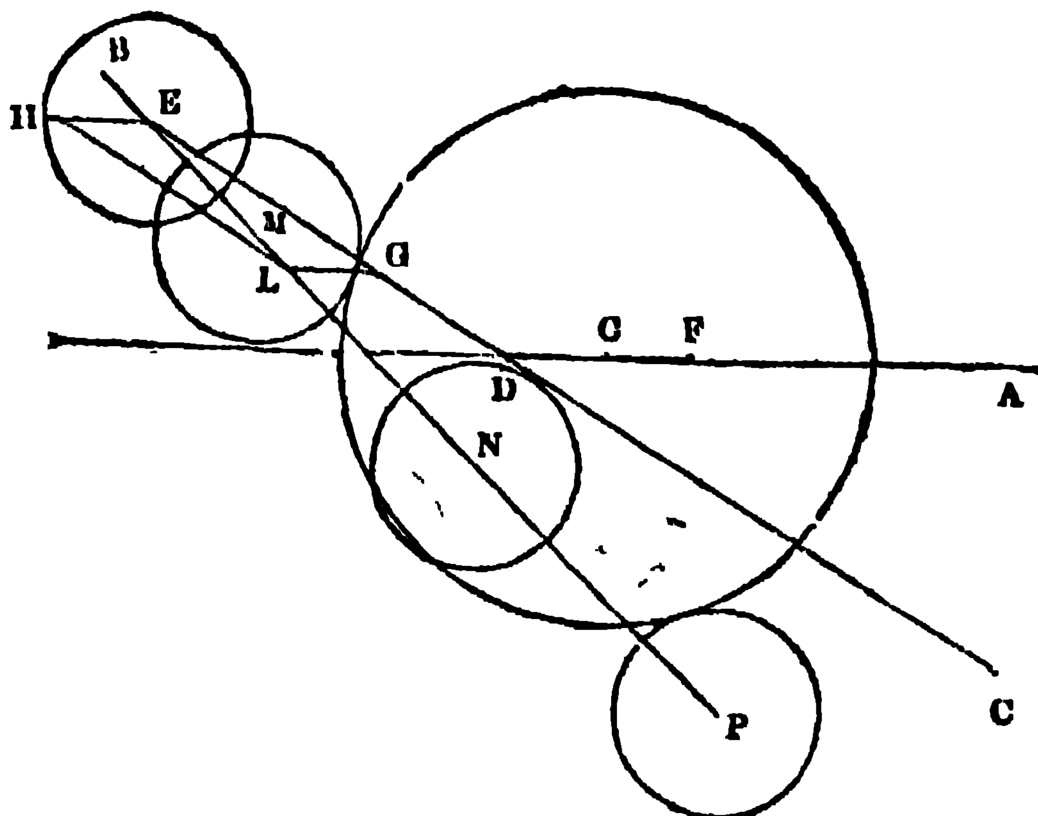
$$39' \times \sin 2 (☾ - ☉)$$

and 11′ × sin (☉'s mean anomaly.)

Many such corrections (but those which remain, of less amount) must be added to or subtracted from the mean longitude before the true longitude can be determined.

Having thus noticed the actual motions of the moon, we proceed to the phenomena of eclipses, and of the harvest-moon, as it is called. An eclipse of the moon has now lost most of its astronomical importance, and can only be useful as an occasional method of finding longitude, when no better is at hand. Eclipses of the sun, observed in a particular way, may be made useful in the correction of the theory both of the sun and moon; in this case matter is absolutely hid from view by matter, and the moment of disappearance can be distinctly perceived. But in the case of the moon, which is eclipsed by entering the shadow of the earth, the deprivation of light is gradual; so that it is hardly possible to note, with astronomical exactness, the instant at which the disappearance of the planet's edge takes place.

In a lunar eclipse the first thing to be ascertained is the diameter of the earth's shadow at the distance of the moon. Suppose this shadow, that is, its section at the distance of the moon, to be represented by the circle whose centre is C: it is directly opposite to the sun, its centre is on the ecliptic, and moves in the direction of the sun's general motion, or from west to east.



Let C A be the ecliptic, and let B C be a part of the moon's orbit, with the node at D. It must be remembered that the whole takes place on a very small part of the sphere, so that all the portions of the orbits which actually come into use may be represented by straight lines. Let the centre of the moon be at E when that of the shadow is at C; and let the hourly motions of the sun (that is, of the shadow) and of the moon be C F and E G. If then we communicate to the whole system a motion equal and contrary to C F [MOTION], the shadow will be reduced to rest, and the relative motion of the moon with respect to it will remain unaltered. Take E H equal to C F, and contrary in direction; then E L will represent the quantity and direction of the hourly motion of the moon relatively to the shadow at rest. By geometrical construction therefore, M, N, and P may be ascertained, the positions of the moon's centre at the beginning, middle, and end of the eclipse; and E M, E N, and E P, at the rate of E L to an hour, represent the times elapsed between that of the moon being at E and the phenomena in question. Such is the geometrical process: the one employed in practice is algebraical, and takes in several minor circumstances which it is not worth while here to notice.

An eclipse of the moon is a universal phenomenon, since the moon actually loses her light, in whole or in part; while in an eclipse of the sun, the moon hides the sun from one part of the earth, but not from another. The former can only take place when the conjunction (or sameness of longitude) of the moon and earth's shadow, that is, the opposition of the sun and moon, or the full moon, happens when the moon is near her node. The subject of eclipses is fully explained, with as little as possible of mathematics, in the 'Library of Useful Knowledge,' 'Astronomy,' pp. 87-101. See also SUN; SAROS. For the phenomena of the occultation of a star by the moon, see OCCULTATION.

By the *harvest-moon* is meant a phenomenon observed in our latitudes at the time of the full moon nearest to the autumnal equinox, when it happens for a few days that the moon, instead of rising fifty-two minutes later every day, rises for several days nearly at the same time. Something of the sort takes place always when the moon is near her node; but the circumstance is most remarkable when it happens at the time of greatest moonlight. The reason is that the increase of declination (which is most rapid when the moon is near the equator, which she must be when full moon comes nearly at the time of the equinox) compensates the retardation which would otherwise arise from her orbital motion. [SPHERE.] See the treatise above cited, pp. 80, 81.

The discovery of the telescope, and the examination of the moon which followed, soon showed that the planet always turns the same face towards the earth, or very nearly. From hence it immediately follows that the moon must revolve round an axis in the same time as that axis revolves round the earth. If any one should walk round a circle without turning himself round, that is, keeping his face always in the same direction, he would present alternately his front and back to the interior of the circle. But if he desires to turn his face always inwards, he must turn round in the same direction as he walks round. [MOTION, DIRECTION OF.] If the moon moved uniformly round in her orbit, and had a uniform rotation of the same duration, then if her axis were perpendicular to the plane of the orbit, and the spectator were always at the earth's centre, the face of the moon would be always actually the same. None of these suppositions are true. 1. The motion in the orbit is irregular, while the rotation is uniform and exactly the sidereal month: the consequence will be that when the moon is moving quicker than the average, a little of the western side will be coming into view, and a small portion of the eastern side will be disappearing, and *vice versâ*. 2. The axis of the moon is not perpendicular to her orbit, but is out of the perpendicular by an angle of 5° 8′ 49″; the consequence is, that as she revolves in her orbit, the north and south poles of the moon will alternately become invisible, each during half a revolution. 3. The spectator is in motion round the earth's axis, which will slightly vary the part seen of the moon in the course of the day. These effects are called librations: (1) the libration in longitude, (2) the libration in latitude, (3) the diurnal libration. The second will be elucidated in SEASONS, CHANGE OF, and the third in PRECESSION and NUTATION.

The way in which we know that the face presented is always nearly the same, is by observation of that face, which is varied by numberless spots and streaks. The following is a view of the average face in the mean state of libration, that is to say, no part of the present edge is ever hidden by libration, without as much of the opposite edge being hidden at some other time.

One cut represents the appearance of the planet; the other is a plan on which numbers and letters are laid down, referring to the following list, which contains the names usually given to them, and which were given by Riccioli, whose nomenclature has been generally adopted. Many other names are given, but the following are the most remarkable:—

1	Pythagoras.	20	Petavius.
2	Endymion.	21	Fracastorius.
3	Plato.	22	Bullialdus.
4	Aristotle.	23	Gassendus
5	Hercules.	24	Arzachel.
6	Atlas.	25	Ptolemy.
7	Heraclides Falsus.	26	Langrenus.
8	Heraclides Verus.	27	Grimaldus.
9	Posidonius.	A	Mare Fœcunditatis.
10	Archimedes.	B	Mare Nectaris.
11	Cleomedes.	C	Mare Tranquillitatis.
12	Aristarchus.	D	Mare Serenitatis.
13	Eratosthenes.	E	Lacus Somniorum.
14	Copernicus.	F	Lacus Mortis.
15	Kepler.	G	Mare Frigoris.
16	Hevelius.	H	Mare Vaporum.
17	Schickardus.	I	Sinus Æstuum.
18	Tycho.	K	Mare Humorum.
19	Pitatus.	M	Oceanus Procellarum.

N Mare Imbrium. P Sinus Roris. R Terra Siccitatis. T Terra Grandinis
O Sinus Iridum. Q Terra Pruinæ. S Palus Nebularum. U Mare Crisium.

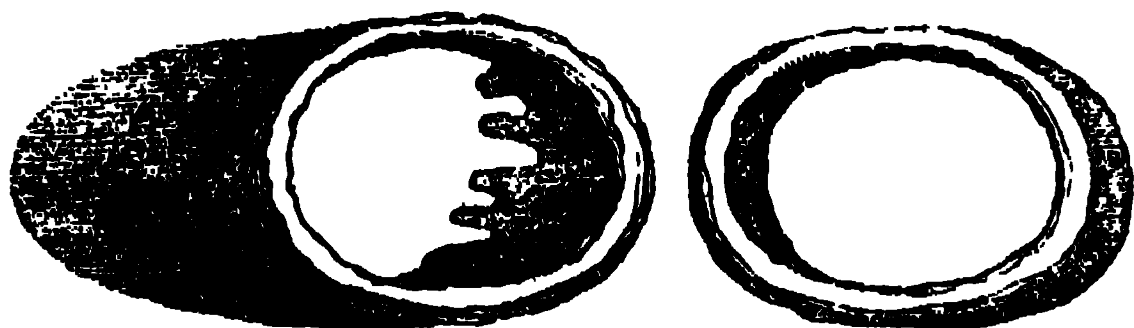


From the manner in which the moon is seen, as well as from the stars, when she approaches near them, undergoing no refraction whatever, it is certain that she has either no atmosphere, or one of a degree of tenuity which must exceed, perhaps, that of the best exhausted receiver. From this it has been inferred that there are no fluids at the surface of the moon, since, if there were, an atmosphere must be formed by evaporation. It is however enough to say that the fluids, if such there be, must be very different from those which abound at the surface of the earth. Since the moon has a day (with reference to the sun) of a whole sidereal month in duration, each part is 14¾ days in sunlight, and 14¾ days without it. The intense heat and cold which must thus alternate would destroy human life, even on the supposition that terrestrial vegetation could be maintained. The fluid on the warm side (if any) must be constantly evaporating and passing off to the colder side. 'The consequence must be absolute aridity below the vertical sun, constant accretion of hoar frost in the opposite region, and perhaps a narrow zone of running water at the borders of the enlightened hemisphere. It is possible, then, that evaporation on the one hand, and condensation on the other, may, to a certain extent, preserve an equilibrium of temperature, and mitigate the extreme severity of both climates.' (Sir J. Herschel, *Astronomy*, p. 230.)

The mass of the moon, as determined from her effect upon the earth's motion, is about one-eightieth (or ·01252) of that of the earth, her volume is one-forty-ninth of that of the earth, and the average density of her material ·615, or about six-tenths, of that of the earth. A body weighing six pounds at the earth would weigh one pound at the moon, if tried against weights which retained their terrestrial gravity. Travelling 10 miles an hour on the surface of the moon, would enable a person to keep up with the sun; so that it is not at all impossible that animal life may be maintained by constant migration, keeping always near the boundary of light and darkness.

The surface of the moon exhibits a very large number of mountains 'almost universally of an exactly circular or cusp shaped form, foreshortened however into ellipses near the limb; but the larger have for the most part flat bottoms within, from which rises centrally a small, steep, conical hill. They offer in short, in its highest perfection, the true *volcanic* character, as it may be seen in the crater of Vesuvius. . . . . . And in some of the principal ones, decided marks of volcanic stratification, arising from successive deposits of ejected matter, may be clearly traced with powerful telescopes. What is moreover extremely singular in the geology of the moon is, that although nothing having the character of seas can be traced (for the dusky spots which are commonly called seas, when closely examined, present appearances incompatible with the supposition of deep water) yet there are large regions perfectly level, and apparently of a decided alluvial character.' (Sir J. Herschel, *Astronomy*, p. 229.) The mountains are known by their shadows, which are perfectly visible, and which are long when they are near the boundary of light and darkness, or when the sun is in the horizon, and disappear when they

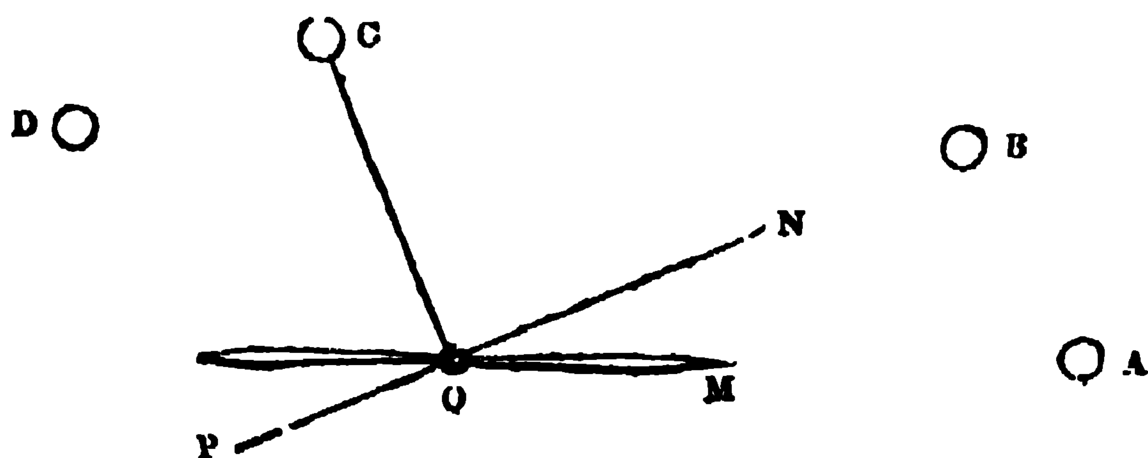
arc 90° from that boundary, or when the sun is overhead. We copy from Schroeter's 'Selenotopographische Fragmente' two representations of the spot Archimedes, the first when very near the dusk part, the second when far from it.



By the help of these shadows, as well by other means, the heights of many of the lunar mountains have been measured, and some have been found whose heights exceed a mile and a half.

It might be supposed that nothing could ever be known of the figure of the moon, since we can only see one side. But this very circumstance leads us to some knowledge on the point. It is impossible to believe that the moon should revolve on her axis precisely in the same average time as she revolves round the earth, without half a second of difference, and not to suppose that there is some mechanical connection between the two revolutions, so that either one is a consequence of the other, or both are consequences of some common cause. As this subject is rarely elucidated in elementary treatises, we have somewhat abridged several of those topics which are usually treated, in order to supply considerations for which we could only refer to treatises of the most mathematical character.

It is well known in mechanics that the rotation of a body is in no way affected, if we suppose its centre of gravity to be fixed instead of moveable, provided the same forces act in both cases. Thus if a stick be tossed into the air (or rather into vacuum) by an impulse communicated at one end, and the same impulse be communicated to a similar stick which revolves on its centre of gravity, the first in its combined rotation and translation, and the second in its rotation only, will always remain parallel to each other, if they were so at first. Let us now suppose a needle placed on a point, and magnetic, round which a ball of iron revolves



from A. If the needle be first at rest, then when the ball moves towards B, it will endeavour to draw the needle towards the position O N, and the needle will begin to revolve in the same direction as the ball. Suppose that by the time the needle points to O N, the ball is at O C, O C and O N being perpendicular; the ball then acts equally on both sides of the needle, and all acceleration of the rotation stops. When the ball arrives at D, it is tending to destroy its former effect, pulling the end P towards it. It may thus be seen that if the needle were heavy enough, the ball would by its motion cause an oscillation, working to produce rotation in one direction during half its revolution, or

rather more, and the opposite effect during rather more than another half revolution, in alternate quarters. But if the needle were light enough, it is easily seen that the rotation in the first direction might be produced so rapidly, that the second mode of action should never be exerted, or the revolving ball should never so far outstrip the needle that N O C should become a right angle. In this case the action would go on in one direction until the needle would acquire a rotation equal to and even exceeding that of the ball. But in the latter case, when the needle overtakes and passes the ball, the opposite action would be immediately exerted, and the acceleration of rotation would be checked. The end would be, that the needle would acquire a rotation equal to that of the ball, on the average, and would revolve so as always to present its point either to the ball, or alternately a little on one side and on the other. The same effect would be produced if the needle, at the commencement, had a rotation nearly equal to that of the ball; the consequence would be, that the action in one direction would continue long enough to establish permanent equality of the average rotations. Without supposing the moon a long needle, with one end turned towards the earth, it is found by calculation, that it is sufficient to suppose it slightly spheroidal, with the longer axis towards the earth. The same mathematical considerations which have so completely resolved the orbital motions, show that the figure of the moon must be an ellipsoid [SURFACES OF THE SECOND DEGREE] revolving round the shorter axis, and presenting the extremity of the longer axis to the earth. But the proportions of these axes have not been well determined, from want of observations: theory has outrun practice on this point. It is but comparatively lately that even the inclination of the moon's equator to the ecliptic has been determined at 1° 30′ 10″·8; that of the equator to the *orbit* being 5° 8′ 49″, as already noticed.

One more very curious phenomenon has been shown to be of the same kind as the preceding; namely, of the sort which must be made absolutely true by the earth's attraction, if it were nearly true at the beginning. The moon's equator cuts her orbit in a line which is always parallel, or very nearly so, to the mean position, for the time being, of the line of nodes of the moon's orbit. If the axis of the moon's rotation were perpendicular to the ecliptic, this must be the case, for the moon's equator and the ecliptic would then be parallel planes. And the moon's axis being nearly perpendicular to the ecliptic, it may be shown from spherical trigonometry that the two lines in question could not make an angle of many degrees. But the fact observed (by Dominic Cassini, before the theory of gravitation was thought of) is either actual parallelism, or something differing from it by very trivial oscillations. It is difficult to represent this phenomenon to a person unacquainted with geometry. It may be thus stated: the moon's orbit, the ecliptic, and the moon's equator, are three planes which form a triangular prism when produced. Or thus: if the moon were made to revolve rapidly round its axis, and if the earth were made a source of light and heat giving seasons to the moon, as the sun does to the earth, then the nodes of the moon's orbit on the ecliptic would coincide with the equinoxes, and the moon's orbit would be divided into summer and winter paths by the same line as that in which the sun's path cuts the orbit.

A great many miscellaneous phenomena connected with the moon might be collected, for which we have not space. For the light thrown on her surface when eclipsed see REFRACTION, for a remarkable appearance sometimes observed when she passes over a star see OCCULTATION; for her use in finding LONGITUDE see that word.

MOON, ECLIPSE OF THE. [MOON.]

MOON, SUPERSTITIONS RESPECTING THE. Brand, in his 'Popular Antiquities,' gives a long list of lunar superstitions. It was formerly conceived that if hogs were killed when the moon was increasing, the bacon would prove the better in boiling. (See the *Husbandman's Practice, or Prognostication for ever*, 8vo., Lond., 1664.)

Tusser, in his 'Five Hundred Points of Husbandry,' under February, says:—

> Sowe peason and beans in the wane of the moon.
> Who soweth them sooner, he soweth too soon;
> That they with the planet may rest and rise,
> And flourish with bearing most plentiful wise.'

In Decker's 'Match me in London,' act i., the king says, 'My lord, doe you see this change i' th moone? Sharp hornes do threaten windy weather.'

Werenfels, in his 'Dissertation upon Superstition (Transl., 8vo., Lond., 1748), p. 6, speaking of a superstitious man, says, 'He will not commit his seed to the earth when the soil, but when the moon requires it. He will have his hair cut when the moon is either in Leo, that his locks may stare like the lion's shag; or in Aries, that they may curl like a ram's horn. Whatever he would have to grow, he sets about it when she is in her increase; but for what he would have made less, he chuses her wane. When the moon is in Taurus, he never can be persuaded to take physic, lest that animal, which chews its cud, should make him cast it up again. If at any time he has a mind to be admitted into the presence of a prince, he will wait till the moon is in conjunction with the sun, for 'tis then the society of an inferior with a superior is salutary and successful.'

Aubrey, in his 'Miscellanies,' says, 'At the first appearance of the new moon after New Year's Day (some say any other new moon is as good), go out in the evening and stand over the spars of a gate or stile, looking on the moon, and say—

> All hail to thee, moon, all hail to thee,
> I prith'ee, good moon, reveal to me
> This night who my husband (wife) shall be.

You must presently after go to bed. I knew two gentlewomen that did this when they were young maids, and they had dreams of those that married them.' Dr. Jamieson has quoted these words as used in Scotland, in a different form.

Tacitus, in his 'Manners of the antient Germans,' observes that 'they hold their meetings on certain days, either at the new or full moon; for they consider these the most favourable times for entering on any business.'

Brand quotes Duchesne's 'History of England,' p. 18, where, speaking of the Irish, he says, 'Quand ils voyent la nouvelle lune, ils flecchissent les genoux et recitent l'Oraison Dominicale, à la fin de laquelle ils disent à haute voix, addressant leur parolle vers elle, "Laisse nous aussi sains que tu nous as trouvez;"' which Vallancey confirms in his 'Collectanea de Rebus Hibernicis,' No. xiii., p. 91. 'The vulgar Irish at this day retain an adoration to the new moon, crossing themselves, and saying 'May thou leave us as safe as thou hast found us.' Park observed a similar practice in the interior of Africa among the Mandingoes.

The *Man in the Moon*, one of the most antient and most popular of our superstitions, is supposed to have originated in the account given in the Book of Numbers, ch. xv., v. 32, &c., of a man who was punished with death for gathering sticks on the Sabbath-day.

MOON SEED is the seed of various kinds of Menispermum, and is so called on account of its figure.

MOOR, a name given to extensive wastes which are covered with heath, and the soil of which consists of poor light earth, mixed generally with a considerable portion of peat. The want of fertility in moors arises chiefly from a deficiency or superabundance of moisture, the subsoil being either too porous to retain it, or too impervious to allow it to escape. Both extremes occur in some moors, which are parched up in dry weather, and converted into a dark mud by any continuance of rain. A considerable portion of iron in a state of hydrate is also generally found in the soil of moors, which is very hurtful to the vegetation of plants, except heath, furze, and other coarse plants, which almost entirely cover the moors. This iron is carried down through the light surface-soil, and, if it meets with a less porous earth below, is frequently deposited in a thin layer, cementing the particles of silicious sand, which are carried down with it, and forming what is called the *heath-pan* or *moor-band*. This substance is perfectly impervious to water, and wherever it exists in a continuous state, all attempts at improvement are vain, till it is broken through or removed. The roots of trees occasionally find a passage through interstices or fractures of the pan, and then often grow luxuriantly. But wherever young trees are planted, without the precaution of breaking through the moorland, they invariably fail, and disappoint the expectations of the planter, who, seeing fine large trees growing around, naturally imagined that the soil was peculiarly fitted for them. If the stump of a large tree, which has been cut down, is grubbed up, pieces of the moor-band may often be seen all around

the stem, at a short depth below the surface, so arranged as to show evidently that the tap-root, having found an aperture, and extending its fibres downwards into a better soil, has, in swelling, broken the pan and pushed it aside. When the moor consists of a loose peaty earth of little depth incumbent on a rock, as is the case in many mountainous countries, no art can fertilise it. In dry weather the whole surface has the appearance of a brown powder like snuff, which becomes a spongy peat as soon as it is soaked with rain. The hardiest heaths and mosses alone can bear this alternation; and where the substratum of rock is not broken into crevices through which the roots penetrate, all vegetation ceases except mosses and lichens.

In the valleys, where the waters have brought various earths mixed with decayed vegetable matter from the surrounding hills, the substance deposited is mostly peat, which is useful as fuel in proportion to the quantity of bitumen and carbon which it contains. When the peaty matter is mixed with a considerable portion of clay and sand, forming a peaty loam, and a convenient outlet can be found for the superabundant water, it is very capable of improvement, chiefly by draining, burning, and liming. [BARREN LAND.] As soon as the heath is destroyed by burning it together with a portion of the surface, and the peat-bog has acquired a certain consistency by draining, the application of hot lime will enable it to produce potatoes and oats, and the peaty matter will soon be converted into a rich soil, abounding in humus, and requiring only repeated cultivation to become extremely fertile. [PEAT.] Much judment is required to know whether a considerable capital may be safely laid out in the improvement of moors. In some cases the return is certain and very considerable; in others the capital is entirely thrown away. Sometimes extensive moors have been converted into flourishing farms of arable and grass land, as in many parts of Scotland and the north of England; sometimes they have been most advantageously planted with forest-trees, and, where there is a great extent of waste and a scanty population, this is generally the most certain mode of improving a property, although the return is slow and distant.

A prudent proprietor, before he begins expensive improvements, will do well to have his wastes carefully examined by a good surveyor. The soil and subsoil, and the situation of the springs, should be carefully ascertained by boring in different places to the depth of five or six feet. It will thus appear whether any portion can be readily converted into arable land, or improved as pasture, or whether plantations of trees may be safely made. The division of the waste into fields by deep ditches will often be sufficient to lay them dry; if not, recourse must be had to draining. In the humid climate of Great Britain and Ireland, the water which falls in rains in the winter half of the year is always more than is necessary for healthy vegetation, and ditches are generally indispensable to keep the surface dry. The convenience of enclosures for pasturing cattle and sheep to advantage, added to this, has made the division of wastes by ditches and banks an invariable preliminary to cultivation. Expensive draining may not always be expedient, where the soil is naturally poor; but wherever there is sufficient loam, either immediately under the peat or mixed with it, and lime can be obtained at a moderate cost, the soil may always be brought into cultivation, and will fully repay any judicious outlay of capital.

In many situations on the slopes of hills, or in the valleys, good earth may be found at a moderate depth, which, being carted on the moor, will materially improve the surface. It should be carted out in the beginning of winter, and spread over the surface an inch or two deep. It should be left so a considerable time, especially if there is any appearance of ochre or iron in the earth. The exposure to the air and rain will convert the hydrate or carbonate of iron into an oxide, and thus render it innoxious. The earth also will absorb fertilising portions of the atmosphere, and be much improved. It may then be ploughed in with a shallow furrow, and incorporated with the natural soil by harrowing. A small quantity of lime and manure will bring this mixture into a productive state.

There are many moors which, although incapable of profitable improvement as arable land, may, at a comparatively small expense, be much improved as pasture for sheep and cattle. The principal means of effecting this are, judicious draining by ditches, and enclosing the fields with banks or stone walls, both as shelter for the stock and convenience of feeding. The heath may be burnt and the ashes spread about, and the surface having been scarified to the depth of a few inches, some grass-seeds suited to the soil and climate may be sown. The surface will soon show a manifest change by the increase of green patches, and a subsequent liming will complete the improvement. When the health of the stock, as well as the increase of food, is taken into the account, it will be found that such an improvement of moor-land soon repays the outlay.

When the surface of the ground is very uneven with protruding rocks, interspersed with large stones, the only improvement which can be undertaken is to plant trees, chiefly of the fir or pine tribe, which will grow well if put in judiciously. The plants should be of the last year only, and the ground where they are to be planted should be well examined to find out whether there is a moor-band or rock below. The first must be broken through, which may be done by trenching or by means of heavy-pointed iron bars thrust into the ground with considerable force, wherever a plant is put in. If there is a rock below with six inches of earth over it, provided it be not of a very compact and solid nature, the fir-trees will grow rapidly, and the roots will find crevices to strike into. A plantation should begin in a sheltered spot, and it may be enlarged every year towards the more exposed side. Thus even the highest and bleakest hills may in time be covered with wood, and, if properly managed, cannot fail to be profitable. [PLANTATIONS.]

Moss-land is often confounded with moor; but it is very distinct in its nature. Moss-land is produced by the accumulation of aquatic plants, and its origin is chiefly vegetable. When it has a considerable depth, and its substance has lost all power of vegetation, it forms peat-bogs of more or less consistency, as the water is drained off or retained in its pores. In the latter case it appears like a spongy vegetable mass, consisting almost entirely of fibres, so interwoven as to form a very light substance, in which water is easily retained, which keeps up a kind of internal vegetation, by which the quantity of the moss is gradually increased. This is the substance which covers the surface of bogs, and where it is of some consistence it allows a passage over them [BOG]; but where it is very thin and loose it deceives the eye by an appearance of solidity, like that of a smooth green pasture, which however gives way to the pressure of the foot, and allows it to sink through it with very little resistance. The only way to improve moss is to drain it, and then convert the vegetable matter of which it is composed into soil, by means of lime and pressure. The latter is effected by putting on a considerable quantity of earth, especially sand and gravel, which, incorporating with the moss, consolidates it, and assists the lime in decomposing the vegetable fibre. After this it becomes extremely fertile, producing abundant crops of potatoes and oats; and whenever it has acquired sufficient solidity by the treading of sheep and cattle, it will produce good crops of wheat, or, if laid down to grass, give abundance of hay and pasture. Trees do not thrive in mossy soil, there being too little solidity for the roots, and the large trunks which are frequently found in bogs must have grown before the moss was formed. This may be easily imagined. A wood laid flat by a storm or hurricane may obstruct the natural flow of the waters, and cause them to accumulate. The prostrate trees become surrounded by aquatic plants, which spread their fibres and roots freely through the water, and, decaying, make room for others. Thus the trees are gradually covered and buried in the moss till future generations find them, when the moss or bog is explored for fuel or for improvement. The trees which are found buried in mosses frequently show evident signs of having been gradually covered. The upper surface is often decayed and uneven, while the lower shows that it has remained submerged and protected from the contact and influence of the air, and thus preserved from rotting.

MOOR-BUZZARD, the English name for *Circus æruginosus* of Aldrovandus and authors. [FALCONIDÆ, vol. x., p. 183.]

MOOR-COCK, one of the names of the Red Grouse.

MOOR-FOWL, one of the names of the Red Grouse.

MOOR-HEN, the common English name for the *Gallinule*, or *Water-hen*, *Fulica chloropus*, Linn.

MOOR-TITLING, one of the names for the *Chick-stone*, *Stone-chatter*, *Stone-chat*, *Stone-smith*, and *Stone-smick*, *Saxicola rubicola*, Bechst.

MOORE, EDWARD, a writer of some dramatic and

poetical reputation, was born in 1712, and bred to the business of a linen-draper, which he followed for some time in London, until he deserted it for the pursuit of literature. He married a lady, named Hamilton, of a strong poetical vein, who was supposed to assist him in his writings. His first metrical work was 'Fables for the Female Sex,' which, though in humour and elegance far inferior to those of Gay, have numbered him, by their pleasing versification and well pointed morals, among the happiest imitators of that writer. These fables were succeeded by 'The Trial of Selim the Persian,' an ingenious complimentary effusion on Lord Lyttelton, in return for some favourable notice from that nobleman.

Moore's dramatic pieces were, two unsuccessful comedies, 'The Foundling' and 'Gil Blas;' and 'The Gamester,' a tragedy, which, without any striking touches of genius, still retains its place on the stage, and its hold on the feelings, by a natural and affecting exhibition of domestic misery. The last literary undertaking in which Moore became engaged was the editorship of 'The World,' a miscellaneous weekly paper, to which Lords Lyttelton and Chesterfield, Horace Walpole, and other distinguished persons of the day contributed. The series closed with the death of Moore, which occurred in 1757.

MOORE, DR. JOHN, M.D., better known as a miscellaneous writer than a physician, was the son of a minister of the Scotch church, and was born at Stirling in the year 1729. In his youth, after having studied in the university of Glasgow, he served for a time as a medical officer in the British army in Flanders, in 1747-8, and subsequently became surgeon to the household of the earl of Albemarle, English ambassador at the court of Versailles. Having passed some years abroad in these stations, he returned to Scotland, and entering into partnership as a surgeon, settled at Glasgow, from whence, after taking his degree as physician, he was induced, in the year 1772, to accompany the young duke of Hamilton to the Continent, in the joint capacity of medical attendant and travelling tutor. With his charge he spent five years in visiting some of the most interesting parts of Europe; and returning home in 1778, and establishing himself in London, he gave the result of his observations of foreign countries to the world in two lively works, under the title of 'A View of Society and Manners in France, Switzerland, and Germany,' and 'in Italy.' These, his first literary productions, were followed by a volume of 'Medical Sketches,' and by 'Zeluco,' the ablest and most popular of his novels, in which he has powerfully portrayed the dreadful effects of indulgence upon a disposition naturally selfish and cruel. His succeeding works, 'A Journal of a Residence in France during the Revolution of 1792,' 'A View of the Causes and Progress of the French Revolution,' 'Edward,' a novel, 'Mordaunt, or Sketches of Life, Character, and Manners in various Countries,' and an edition of Smollett's works, with a memoir of the author, had upon the whole inferior merit. His personal character is said to have been adorned with many estimable and pleasing qualities; the knowledge of the world which he had acquired in foreign travel caused his society to be much courted; and his conversation, aided by a countenance full of expression, was distinguished by the same tone of moral sentiment, as well as by the same shrewdness of remark and caustic humour, which appear in his writings. He died at Richmond, near London, in 1802.

A complete edition of Dr. Moore's works in seven volumes, with an apparently accurate Memoir of his Life, by Robert Anderson, M.D., was published in Edinburgh, in 1820.

MOORE, SIR JOHN, a lieutenant-general and knight of the bath, one of the most distinguished British officers of modern times, was the eldest son of the author of 'Zeluco.' He was born at Glasgow in the year 1761, and received his first commission in the army at the age of fifteen years. The aristocratic connections formed by his father secured his rapid advancement; and before he found the earliest occasion of proving his personal merit, he had already been some years a lieutenant-colonel, and had also sat in parliament for the Lanark district of boroughs. It was in the descent of the British troops upon Corsica, in 1794, in concert with the patriotic Paoli, that Moore first distinguished himself; and in subsequent services, in the West Indies in 1796, in Ireland during the rebellion of 1798, and in the disastrous expedition to Holland in the following year, in which he received two severe wounds, he fully established for himself the reputation of an officer of the highest promise. A more auspicious duty now awaited him; and in the expedition to Egypt in 1801, with the rank of major-general, he commanded the reserve of the army, and highly distinguished himself at its head. For his services in this campaign, in which he was again wounded, he was deservedly created a knight of the bath.

On the recommencement of hostilities, after the short peace of 1802, Moore was usefully employed, by his own desire, in a camp of instruction on the Kentish coast, in training his own and several other regiments as light infantry; and these troops, of which the renowned light division of the Duke of Wellington's army in the Peninsular War was afterwards composed, gave by their achievements the best proof of the value of the system on which they had been instructed in the school of Moore. The freedom and simplicity of movement, which he had substituted for some of the pedantries of the German tactics, were found as desirable and as well calculated for the general service of the infantry as for light troops alone; and these improvements have accordingly been incorporated into the existing regulations for the exercises of the British army.

From the business of tactical instruction, Moore was called to more active service; and after being for some time employed in the occupation of Sicily, he was sent, in May, 1808, at the head of a body of about 10,000 men, to Sweden, with a view of aiding the gallant but unreasonable sovereign of that country, Gustavus Adolphus IV., in the defence of his dominions against the designs of Napoleon. On this arduous mission, he became involved in a serious dispute with the eccentric king, from which he, not without some difficulty, extricated himself and his troops; and he returned with them to England at that crisis in the war against France, which opened to the British arms a new field of action in the Spanish Peninsula: a field destined to witness his calamitous struggle and victorious fall, and to immortalise at once his misfortunes and his glory.

Moore landed in Portugal, in August, 1808, too late to share in the battle of Vimiero: but after the expulsion of the French from that kingdom, and the recall of the British generals who had negotiated the Convention of Cintra, he was appointed to the command of the army which, to the number of 5000 cavalry and 30,000 infantry, was intended to co-operate with the Spanish forces in the north of the Peninsula against the French invaders. Of this auxiliary army, part was to arrive direct from England under Sir David Baird, and to land at Coruña, while the greater proportion, composed of troops already in Portugal, was to be led by Moore himself to the scene of operations. He accordingly began his march from Lisbon in October, 1808: but he had scarcely entered Spain before the defeat and destruction of the Spanish armies at all points on their northern line utterly extinguished the prospect of a successful campaign. On a false report that the direct northern road through Almeida, by which his infantry had advanced, was impassable for artillery, he had imprudently been induced to send his cavalry and guns, under Sir John Hope, by a circuitous southern route through Badajos; to the north, a long tract of country still divided him from the troops which had landed under Baird at Coruña; and with forces thus widely disjointed, he found himself exposed to the assaults of victorious and rapidly advancing French armies of immense numerical superiority. In this critical position, he remained for some time inactive at Salamanca, urged by his own desponding views of the contest to retreat into Portugal, and goaded by the sanguine temper of the British ambassador in Spain, Mr. Frere, to advance, with assurances that his presence might yet preserve Madrid from falling into the hands of the enemy. The surrender of that capital soon dispelled so much of the ambassador's illusions: yet the intelligence was followed by some indecisive movements on the part of the British general against the advanced corps of the enemy under Soult, until he suddenly ascertained that the whole of the disposable French armies in the Peninsula were gathering to surround him. Rejecting all hope of the defence of Portugal, he commenced a rapid, if not too precipitate, retreat to Coruña: the sufferings and disorders of which, conducted as it was in the depth of a severe winter, and through the mountainous region of Gallicia, will long be remembered in our military annals. Its disasters were closed, on the 16th of January, 1809, by the battle of Coruña, in which the troops, though previously to

all appearance exhausted and disorganised, were reanimated, by the exertion of their gallant leader and their own native valour, to inflict a decisive repulse upon their pursuers. Their triumph was dearly purchased by the loss of their commander: the circumstances of whose death may challenge and support a comparison with the most illustrious examples of heroism in antient and modern times, with the last moments of an Epaminondas, a Bayard, or a Wolfe. He probably had little desire to survive the mental agony which he had suffered in so disastrous a retreat; he expressed great satisfaction that the enemy were beaten; he reminded his sorrowing friends 'that he had always wished to die in that way;' and his expiring words breathed a hope that 'the people of England would be satisfied—that his country would do him justice.'

The operations of the memorable campaign in which Moore had so gallantly fallen were canvassed after the event with all the virulence of faction by conflicting parties, who either desired to shift the blame of failure from the government on the general, or to transfer it from him to his employers. Scarcely indeed has the question, which must determine Moore's claims to the character of an able commander, been impartially treated even to this day. The noble and graceful virtues of his private life, his lofty and generous sense of honour, his chivalrous courage, his forgetfulness of himself, and his enthusiastic devotion to the service of his country, even his enemies have been unable to deny. In stations of subordinate command, he had also unquestionably displayed very considerable talents, and a perfect acquaintance with the science of his profession. But until the campaign of 1808-9 he had never held the chief command in the field; and the fact whether he possessed the highest qualities of military genius must be tried by his conduct in that arduous service. He was placed in a position of the utmost difficulty; with an army, which, though full of courage, was young in action, and not inured to privation; with an inexperienced staff, and a commissariat wretchedly defective; without the means of obtaining either information or supplies, in a country where warfare has, in all ages, been attended by peculiar difficulties; called upon to aid a nation as full of blind presumption and ignorance, as its rulers were of imbecility and treachery; and opposed to armies ably commanded, thoroughly organised in every department, long seasoned to warfare, and immensely superior in numbers. These were difficulties under which any but the commander of first-rate ability and unshaken confidence in the resources of his own comprehensive intellect was sure to sink; and that Moore was not found equal to them is no more a subject of reproach upon his zealous and gallant spirit, than that nature had not endowed him with the genius of a Fabius or a Wellington. He wanted in fact that perfect undoubting trust in himself, in every adversity, which is characteristic of the greatest commanders, and belongs to the very highest order of minds. He disbelieved in his own ability, and overrated that of his opponents. From the first to the last, he desponded of fortune, and foresaw only disasters: he hesitated only in vigorous action, and decided upon nothing but failure. The Duke of Wellington has generously said, that he could discover only one error in Moore's campaign, in not providing for retreat when he advanced against Soult: but the neglect of preparation for an orderly and gradual retrograde movement through the strong country of Gallicia was only indicative of the same absence of all hopefulness, which had already pronounced Portugal itself indefensible. How the events of the following campaigns refuted this opinion need not here be said; but Moore, in his despair and dread of responsibility, abandoned every thought except the preservation of the army.

That he achieved this object without dishonour is sufficient to redeem all the errors, if such there were, which had attended his career; and it should ever be gratefully remembered to his glory, that, when there were those under his command at Coruña who dared to utter hints of a convention with the French for obtaining permission to embark unmolested, he indignantly spurned the proposal, as unworthy of a British army which, amidst all its sufferings, had never known defeat. He welcomed indeed a battle as the surest means of clearing every stain from the dubious character of his retreat; he was as doubtless of victory on the coast at Coruña, as he had been apprehensive of destruction in the interior of Spain; and in that last act of undaunted firmness, he put a seal with his blood to a whole life of magnanimous devotion.

The personal history of Sir John Moore has been written at some length in a memoir contained in the third volume of Gleig's 'Lives of British Military Commanders;' and more recently, in a Life of him, by his brother, in 2 vols. 8vo., 1834: but elaborate investigations of his last campaign may be found in the justificatory 'Narrative' of his brother (London, 4to., 1809), and in a criticism on it in the second volume of the 'Quarterly Review;' in Colonel Sir John Jones's 'Account of the War in Spain and Portugal, and in the first volume of Colonel Napier's 'History of the War in the Peninsula,' which the author, a zealous and ardent partisan, has consecrated to the eulogy of Moore, and to the able defence of his operations.

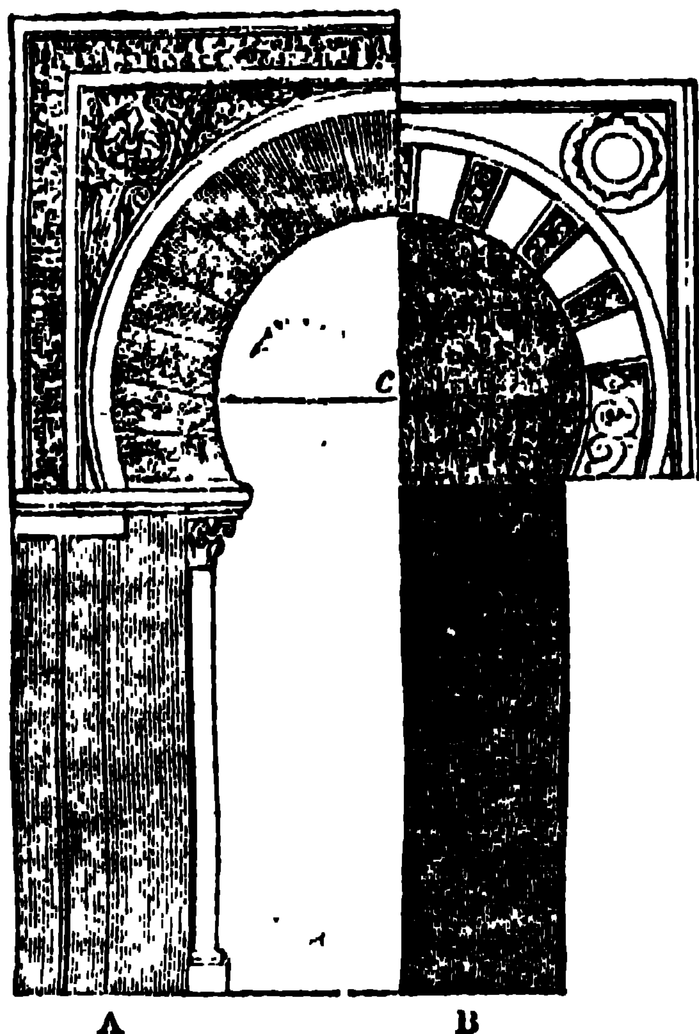
MOORISH ARCHITECTURE, otherwise the Moresque style, that variety of Saracenic or Mohammedan architecture practised by the Arabs or Moors of Spain, and of which many exquisite remains in that country, at Cordova, Granada, &c. [ALHAMBRA], still attest both their skill and taste. Although some have spoken very slightingly of this style as exceedingly fanciful and capricious, by others it has been rapturously extolled as the most poetical and fairy-like species of architecture, and highly characteristic of a refined, luxurious, and imaginative people; and although it must be confessed that it is not reducible to any fixed rules, it is evident that it was formed according to consistent principles of taste, and that it is marked by a strong national physiognomy. One of its most striking and peculiar features is the *horse-shoe arch*, or, as it might with more propriety be termed, the *crescent arch*, because it resembles that symbol of Mohammedan faith, and was therefore in all probability expressly adopted in imitation of it. This being admitted, at once and naturally accounts for a form that is else very unlikely to have suggested itself, or to have originated in any purpose of construction; so far therefore this hypothesis of ours—for we have not borrowed it from any one else—has something like a plausible basis to rest upon. Perhaps, too, the same religious symbol may be recognised in the smaller curves or scallopings which frequently serrate or indent the outline of the arch itself, and from which, no doubt, were borrowed the cusps that form the trefoils, quatrefoils, &c. in Gothic architecture, though certainly not out of respect to the symbol of Islamism.* To the crescent or horse-shoe arch, again, we should point as having directly suggested the crescent or bulbous dome, so characteristic a form of that feature in Mohammedan countries. The outline or section of the latter accords so strikingly with the curvature of the other (the one being constructed at its base, the other at its span), that we can hardly suppose it to have been a merely accidental coincidence, especially as such form of dome is hardly to be accounted for otherwise than by some intention of the kind; and more particularly if the dome of Santa Sophia is to be received as the prototype for such feature in Mohammedan architecture. So far from its being altogether capricious, this style appears to exhibit a singular degree of intention and consistency, although they cannot be said to be perfectly architectonic, or to have been dictated by constructive principles. It is true the bulbous dome does not exactly belong to Moorish architecture, but rather to the latter Mohammedan, still we may be excused for referring to it in our estimate of the style generally; and we may further remark, that domes of such shape bear some analogy to that of the Oriental turban, which form of head-dress may possibly in some degree have led to a taste in favour of a similar-shaped covering or *head* to a mosque or other building: and we may observe that the term Glava, or head, is employed by the Russians in the meaning of a dome or cupola.

Although the horse-shoe arch is a peculiar, by no means however is it a constant feature in the style, or employed to the exclusion of other forms of arches; on the contrary, there are several varieties, comprising the pointed horse-shoe, and others, as is shown in the annexed figures.

Fig. 1 is an example of the crescent or horse-shoe form, having the centre *c* on the diameter of the arch raised above the chord or spring of the curve (the dotted line), and consequently the curve itself is greater than a semicircle. The same figure further exemplifies some differences of application, the side or half A showing the arch supported

* Whether the pointed arch was actually borrowed from Saracenic architecture or not, it was certainly practised in that style long before our European Gothic arose. It was common in the Mohammedan structures of Cairo in the tenth century; and Hessemer refers to the Mosque Tolun, erected by Ahmed Ibn Tolun, in 877-880, as the earliest instance of it whose date can be depended upon with certainty.

Fig. 1



on columns, the other without columns; besides which it illustrates other variations; for on the side B the head of the arch is closed over a square-headed aperture not wider than the span or chord; whereas on the side A the opening between the columns is as wide as the diameter of the arch itself in its greatest width through the centre *c*.

Fig. 2.

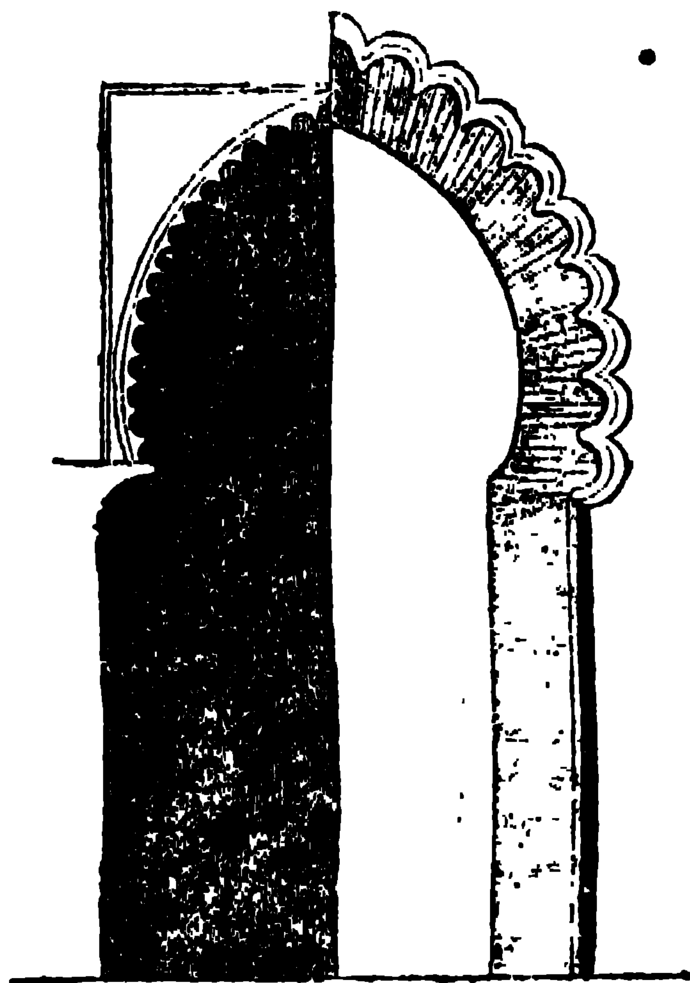


Fig. 2 is an instance of a pointed crescent arch, it being struck from two centres, which, as in the other case, are elevated above the line of the impost, or spring, from which the curve commences. This figure also exhibits two varieties of decorations, both of them by scalloping; one half being scalloped on the intrados, or edge of the arch itself; and in the other, the extrados, or outer circumference, being so cut, or more properly speaking, the edge of the face of the wall within which the arch recedes; of which kind is the gate in what is called the Casa del Carbon at Granada.

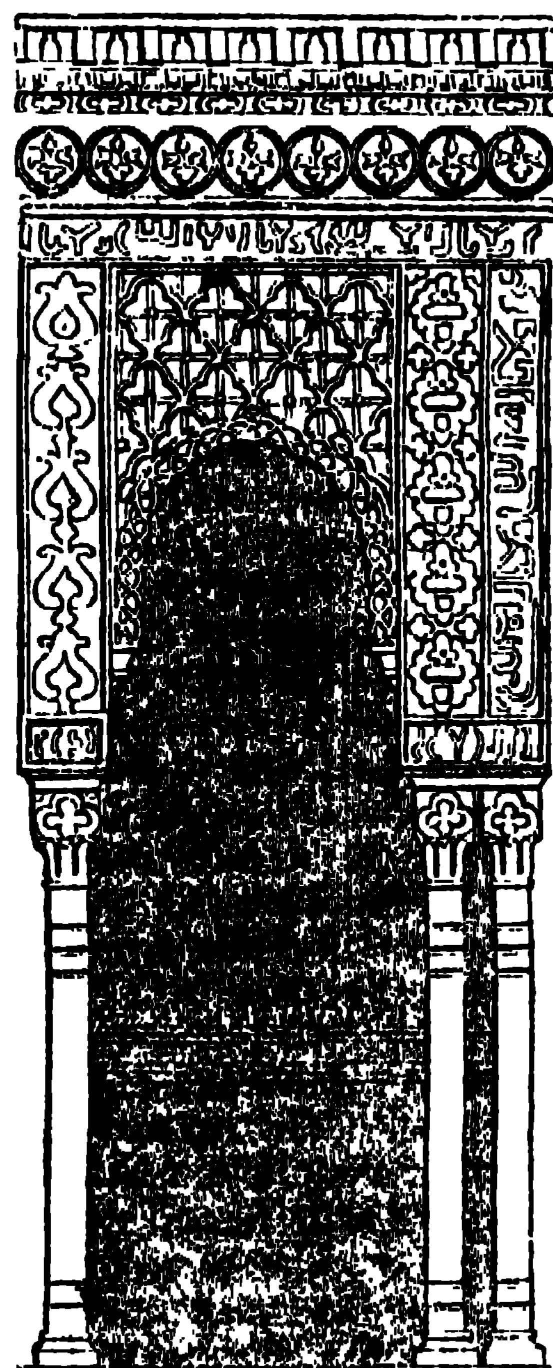
The next example is of what may be called the cusped or scalloped arch, strictly so termed, the outline being produced by intersecting semicircles, similar to the trefoil-headed compartments in our Gothic windows; but beyond that general resemblance, which certainly goes far to confirm the opinion that the Gothic style borrowed something from the Saracenic, the character is altogether different, not only because it is here the whole arch which is so shaped, instead of merely a subdivision within a larger opening, but also both on account of the external moulding following the same form, and of quite a different mode of decoration. In Gothic architecture the spandrels, or triangular spaces between the foils, are panelled with splayed surfaces uniting in the centre. Arches of the kind here shown occur in the sanctuary of the great mosque at Cordova, where they rest upon columns which both in their capitals and shafts bear considerable similarity to Corinthian ones, except that they are shorter and without bases, and are therefore very different from the slender pillars peculiar to Arabian architecture.

Fig. 3.



Fig. 4 exhibits an example of such pillars, and also another variety of Moorish arches (from the Court of the Lions in the Alhambra) very unlike any of the preceding

4.



specimens, it being circular-headed, and *stilted*, that is, it is considerably more than a semicircle, its height in fact almost equal to its breadth, but, instead of contracting downwards, like the horse-shoe form, it is continued down straight to the impost, whereby the arch or semicircle has the appearance of being raised or *stilted*, and made loftier than the arch itself would else be. It also exhibits another peculiarity which the Arabs seem greatly to have affected, namely, *corbelling*, or resting arches upon brackets which serve as their imposts; owing to which such arches have the appearance of being suspended over the opening below, which becomes wider and the support or pillar slenderer in proportion to the projection given to the corbels.

The above will suffice to show the principal varieties, in which we have chiefly attended to the form of the arches themselves, without attempting to show detail and decoration, to which it would be impossible to do any sort of justice upon so contracted a scale, although it may serve for mere explanation. As supplementary however to what has been said, it should be observed as one characteristic of the style, that whatever their shape, or however applied, arches are generally placed within a square-headed panel or compartment, variously ornamented, and frequently surrounded with a margin or border similar to the square label in Gothic architecture (see Gothic Architecture, page 326, cut, for instance of a highly enriched compartment in which the arch is set). Sometimes there are two margins or labels,

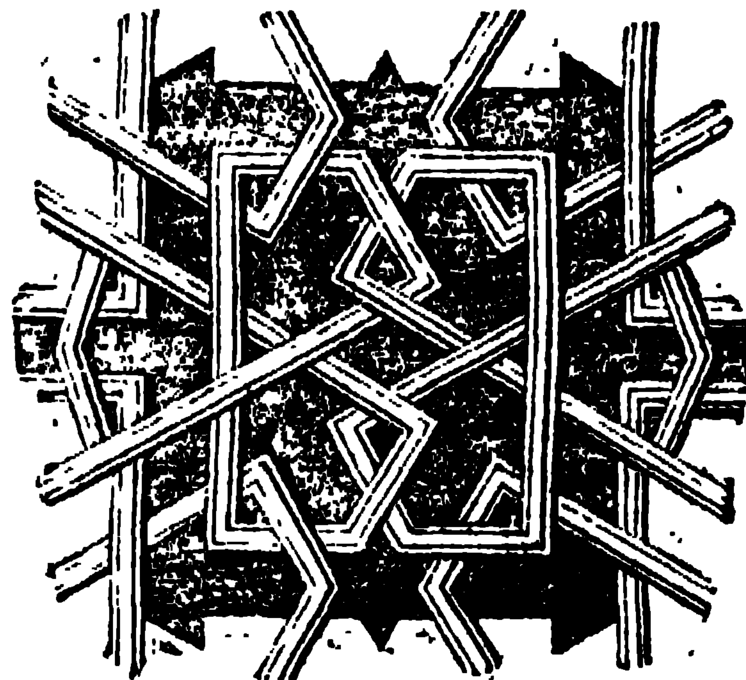
and the space between them is filled up either with inscriptions or other decoration. This mode however was confined to large arches, not supported upon columns, but forming an opening through a wall, for a gate or door; and it was for such purposes that the crescent arch was chiefly used, particularly for entrances to mosques. These were further distinguished by the breadth and richness of the archivolt or border surrounding the arch; and which was sometimes equal to the radius or semidiameter of the curve. In some instances the whole archivolt was uniformly decorated; in others only at intervals, or on the alternate voussoirs or arch-stones, some idea of which may be obtained from B, *fig.* 1.

Pillars are in general of exceedingly slender proportions, almost to apparent insecurity, and certainly by far too much so to satisfy those who acknowledge no other standard of beauty than classical architecture. Yet the lightness thus produced is altogether different from that which is the character of Chinese architecture, where, owing to the naked poverty of the forms themselves, and the style of embellishment, it degenerates into flimsiness; whereas in the Moorish or Arabian style the lightness of particular forms tends rather to heighten the general luxuriance. Some have imagined that this element of slenderness in regard to pillars indicates a tent origin of the style; and that while the pillars themselves were fashioned in imitation of the poles which supported the awning, the idea of the latter was in a measure kept up by the general decoration of various devices in mosaic work, and painted stucco, or glazed tiles, which gave to the whole the semblance of being covered with richly-patterned carpeting or embroidered tapestry; not indeed in exact imitation or so as to aim at illusion, but with just that degree of adherence to a prototype which is observable in all artist-like architectural decoration. This tent-like character was further kept up by concave ceilings and cupolas, emblazoned with painting and gilding. The whole surface was frequently broidered over with decoration, which consisted almost entirely of ornamental patterns composed either of foliage or geometrical figures, though occasionally with an intermixture o th. The decorations of the former class have given rise to the modern term *Arabesques*, as indicating scroll-work and foliage ornament filling up a frieze or compartment, although it is not very correctly applied, being usually intended to express a combination of animal and vegetable forms, human figures and those of birds and quadrupeds terminating in foliage and flowers; whereas no such mixture occurs in Arabian architecture, all imitation of the human or even animal shape being interdicted by the Mohammedan law. Their geometrical patterns exhibit singular beauty and complexity, inexhaustible variety of combinations, and a wonderful degree of harmonious intricacy, arising out of very simple elements; to which must be added the variety produced by colour also, whereby the same arrangements of lines and figures could be greatly diversified. Hence though apparently quite unmeaning, and intended only to gratify the eye, such embellishment must have powerfully recommended itself to a people both imaginative and contemplative, and whose fancy would find occupation in patiently tracing and unravelling the manifold intricacies and involvements, the mazes of what at first sight looks like a mere labyrinth, until its scheme unfolds itself; but merely momentarily as it were, being again lost when attention is diverted from it to particular parts. It is on this account that Hessemer assigns so very high a value to Arabian decoration, as being strictly ornamental and strikingly characteristic.

One very prevalent and very peculiar element of Arabian decoration is the use of inscriptions evidently with reference to their ornamental effect. So far there is a very striking analogy between the practice of the Moslems and that of the antient Egyptians: if the latter covered the walls of their edifices with hieroglyphics, the others inscribed theirs no less profusely with sentences; and the characters of their ordinary writing, elegant and fanciful in themselves, were as studiously ornate and calligraphic as possible; and so well do they harmonise with the rest, as to seem to belong to the embellishment, and to have sufficient value as such independent of their meaning. Neither was the effect of colouring and gilding wanting to set off the inscriptions in the most brilliant manner. In short, even by those who consider much of it to have been in false taste, architectural decoration must be allowed to have been carried by the Arabians to a very high pitch; and although it may be too florid, too prodigal, too *inflated*, and overlaid with ornament, it well deserves to be studied, if not to be copied, as many ideas may be derived from it, for novel combinations both of forms and colours. And for such study we may here point out Mr. Owen Jones's splendid work on the 'Alhambra,' and Hessemer's 'Arabische Bauverzierungen;' in both of which publications the plates exhibit the original colours.

Lattice or open trellis-work was another fertile source of embellishment, and was very much akin to the perforated tracery frequently met with in Gothic buildings. In this respect the two styles display great similarity of taste, distinguishing themselves herein from almost every other; notwithstanding that each has a peculiar character of its own. This species of ornamental work is supposed by some to have been derived from netting suspended before apertures in order to exclude insects; and in Arabian architecture it certainly partakes far more of the character of network than Gothic tracery does, the interstices being smaller, and the design filling the whole of one aperture; whereas in the Gothic style the ornamental tracery is confined to the heads of windows. Besides which, the character of Arabian tracery—if we may venture so to call it—is altogether different, it being composed of straight lines, frequently so disposed as to form stars in some parts of the design. As far as an idea of the peculiarities of the style in this respect can be formed from a single specimen, the example here annexed (on the authority of Hessemer) of a portion of a window in the mosque of Hakim at Cairo, may be of some assistance. The pattern is rich and playful; and

Fig. 5.



notwithstanding that, although regular, it appears at first sight to be rather complicated, will be found to be composed of merely a repetition of the same forms, yet producing a constant variety, according as the lozenge or the star is fixed upon by the eye as the centre from which the rest of the pattern diverges.

Of perforated battlements and parapets, this style furnishes some exceedingly rich and tasteful specimens, although not among the remains of Moorish architecture in Spain. Several of them are exceedingly intricate and delicate also, and may therefore, almost without exaggeration, be compared to lace-work as seen against the sky. Of this kind are the parapets of the mosques Lashar and Akmer at Cairo, which in some parts have perforated battlements of fanciful outline rising above the general parapet of open work. Curves, forming pointed horse-shoe arches, occur in some of the patterns; further than this it is impossible to pretend to describe them, except it be to remark that the stone-work is very slender, and the open spaces large in proportion, and that the ribs or stems of which the former is composed have something the resemblance of being interwoven, one passing alternately before and behind the next, after the fashion of wicker-work.

Equal fancy and diversity of invention are shown in the devices of mosaics and pavements, many of which appear exceedingly elaborate, although, when analysed, they are found to be very simple in principle: for instance, some patterns exhibiting octagons, stars, and other figures, are produced merely by series of zigzag lines intersecting each other at right angles, different combinations being obtained according as the points of the zigzags are turned from or towards each other. Among the other ornaments which mark this style, the honeycomb fretwork and stalactites-like drops, or pendents of ceilings and roofs, deserve to be mentioned; also the small star-shaped apertures cut in a sloping direction through the domes or vaults over baths, for the purpose of admitting only a subdued degree of light. These

latter must be allowed to be a highly pleasing and ingenious contrivance; and if, in regard to the other enrichments, there was oftentimes too lavish a prodigality, it was almost uniformly accompanied by a powerful degree of the poetical and picturesque.

The above are the principal characteristic elements of the style generally, but all of them do not enter into every design. Domes and minarets [MINARET], for instance, are features almost confined to mosques and other religious edifices. Instead, too, of being employed singly, domes were occasionally introduced in great profusion, there being, besides the principal one, a number of smaller ones, sometimes according and at others contrasting with it in shape. Variety and contrast were further greatly increased by the lofty and slender forms of minarets being opposed to the swelling curves of domes; owing to which combination, buildings in this style often exhibit a very striking picturesqueness of outline.

Such features however do not occur in the remains of Moorish architecture within the Spanish peninsula. Externally they are rather plain than at all remarkable for richness: even the Alhambra itself, gorgeous as it is in its courts and halls, bears on its outside less the character of a palace than of a fortress composed of irregular masses of building and square towers of various dimensions, forming an ensemble wild, rude, and irregular, but eminently characteristic and impressive. A certain severity and solidity likewise distinguish the mosque at Cordova, which belongs to the earlier epoch of the style, it having been erected in the first century after the Moors had established themselves in Spain. It is an insulated oblong building, extending 620 feet from north to south, including a spacious court at its north end or side. The interior presents almost a forest of jasper and other marble columns, upwards of six hundred in number, and dividing the plan into eleven aisles in one direction (350 feet in length), and thirty-five in the other. In that division of the building appropriated to the imams and chiefs was the great *kibla*, or sanctuary (in which the Korân was deposited), an octagon covered with a dome shaped out of a single block of stone;—the *mihrab*, or pulpit, and the *maksura*, or khalif's seat. After the conquest of the city in 1236, by San Ferdinand, this mosque was converted into the cathedral, in consequence of which the character of the interior has been greatly injured by the erection of a Gothic choir in its centre. As a splendid work of a later epoch of the style, Cordova could once boast of the palace called the Az-zahrâ, erected about the middle of the tenth century by the celebrated Abd-el-rhaman III., the eighth Umeyyah sovereign of Spain. Of this edifice, which was at the distance of about two leagues from the city, nothing now remains to attest its former magnificence, except the descriptions given of it by Mohammedan writers, according to which it was adorned with four thousand marble pillars, and had walls and pavements of the same material. The sumptuousness ascribed to the edifice and its fountains and baths might pass for mere Oriental hyperbolism, were it not that the evidence still afforded by the Alhambra, and by parts of the Alcazar at Seville, removes the suspicion of exaggeration; or rather, the exuberant beauties revealed to us by the latter structures greatly surpass anything the most florid description can picture to the mind. The Alhambra, the residence of the Moorish kings of Granada, is supposed by some to have been founded by Mohammed Ibn Alhamar, the first ruler, who reigned from 1238 to 1273; according to others, was begun by his successor Mohammed II. (1273-1302), or by Nasser, and completed by Abu-l-hejaj in 1348. This highly interesting and important monument of western Arabian architecture is now rendered comparatively familiar to us, both by descriptions and drawings, and by geometrical and pictorial illustrations of its principal parts and decorations. Besides the two elaborate publications by Murphy and Jones, many drawings of a more popular kind have been given us by Roberts, Lewis, and other able draftsmen, besides several including other specimens of the same style in the 'Landscape Annual' for 1835 and 1836. As a modernised imitation of the style—that is, as far as a few generalities of form go, the Pavilion at Brighton may be mentioned, though it is little better than a shadow or faint reflection of the original. Any adequate copy of such architecture is now almost out of the question: yet specimens of it might occasionally be introduced with both propriety and effect, in single apartments or enclosed courts, where it could be made to display itself upon a moderate scale, and without requiring to be kept up in any other portion of the building. It also recommends itself for detached ornamental buildings in gardens and pleasure-grounds, provided its spirit be adhered to without regard to economy, where economy becomes wasteful absurdity.

MOORS. This name is generally given to the Arabs who subdued Spain at the beginning of the eighth century, and held it until the latter end of the fifteenth. In the chronicles of Spain and France they are designated by the writers of the middle ages under various denominations; they are called by some *Sarraceni*, from *Sharkyin* (Eastern people), *Agareni*, or descendants of Agar, and *Ismaelitæ*, or sons of Ismael. By more polished writers, like Rodericus Toletanus, and others, they are styled *Arabes*, but their most common denomination, and perhaps the most appropriate, is that of Moors (*Mauri*), owing to their having come from that part of Africa known to the Romans by the name of Mauritania.

Thirty-five years after the death of their prophet, the Arabs, after conquering the fertile regions of Asia, invaded the vast continent of Africa. The deserts of Barca and Marmarica, once so formidable to the Roman legions, were completely overrun; Carthage, still the proud capital of Africa, was levelled with the dust, and after forty years of unremitting warfare the whole continent of Africa, from the Pillars of Hercules to the farthest limits of Sudan, received the laws of the Arabian conquerors. [BERBER.] Far from being satisfied with the possession of so many kingdoms, the military ardour of the Arabs seems to have received fresh vigour from every succeeding conquest, for no sooner were they firmly established in Africa than they invaded and subdued Spain.

The immediate causes and most of the incidents of that memorable invasion by which the Arabs were brought into the very heart of Europe, are involved in fabulous obscurity. The chronicles of that country point out, it is true, an incensed nobleman named Julian, who is said to have secretly invited the Arabs to invade the country; but this account, unsupported by historical evidence, has of late been rejected as altogether inconsistent with truth. The geographical position of the peninsula, its genial climate and reputed wealth, the necessity of giving employment to the motley tribes of Berbers who were daily flocking to the standard of the Arabian generals, the spirit of discord reigning in the Gothic monarchy, and the proffered assistance of the Jews, who, under the reign of Roderic's predecessors, had been subjected to the most cruel treatment, are no doubt among the causes which led to that striking event.

On the 5th day of the moon of Rejeb, A.H. 92, which corresponds to April 30th, A.D. 711, Târik, a freedman of Músa Ibn Nosseyr, the Arabian viceroy of Africa, landed with a small band of followers at the foot of the rock Calpé, which received afterwards his name (Jebal-Târik, or Gibraltar), and two months after his disembarkation the memorable battle was fought on the banks of the Guadalete, which put an end to the Gothic empire of Spain. Cordova, Granada, Jaen, Malaga, Toledo, then the capital of Spain, were either speedily reduced or opened their gates to the conquerors, and before Músa, who was now hastening from Africa at the head of considerable forces, could land at Algesiras, his lieutenant Târik was the master of the wealthiest cities and the most extensive provinces in the peninsula. On the arrival of Músa the whole country, with the exception of the mountain crags of the Asturias, was subdued with that rapidity which characterised Arabian conquest.

1st Period, A.D. 711-756.—*Governors of Mohammedan Spain.*—During the first forty-six years after the conquest Spain was governed by Amirs, dependent upon and appointed by the viceroys of Africa, and not unfrequently raised to command by the voice of the people or the will of the army. Their number was twenty-one, including Târik Ibn Zeyâd, the first instrument of the conquest, and his master Músa, who, on his arrival in Spain (April, 712), assumed the supreme command, and the duration of their government was forty-six years. Their names and chronology are as follows:—

Abd-el-aziz, son of Músa, who, on his father's departure for Damascus, whither he was summoned in 714 to answer the charges brought against him, remained entrusted with the command, followed up the conquests made by his father. He subdued Lusitania, invaded Navarre, and consolidated the Arabian empire of Spain. After a govern-

ment of nearly two years (716), he was assassinated by the orders of the khalif Suleymán, while performing morning prayers in the mosque of Seville, then the seat of Arabian government.

Ayúb Ibn Habíb Al-lakhmi, one of the officers entrusted by the khalif with the execution of his sentence, administered the affairs of the country for six months, until the arrival of the governor Al-haur Ibn Abd-al-rahman, A.D. 717.

Al-haur made a successful incursion into Gothic Gaul (718), and gained considerable spoil; but his severity and his tyrannical exactions, which fell alike on the natives and on the Arabs, excited great discontent against him. The complaints of the people reached the court of Damascus, and he was deposed at the end of 718.

As-samh Ibn Málik was the next general appointed to govern Spain. Under his command the Moslems penetrated once more into Gothic Gaul, took Carcassone and Narbonne, and were on the point of reducing the important city of Toulouse, when a defeat experienced under its walls obliged them to return to the peninsula. This memorable battle, in which the Arabian governor himself and thousands of his bravest warriors fell, took place in May, 721.

Anbasah Ibn Sohaïm Al-kelbi, his successor in command, administered the peninsula for four years and five months, during which he made some trifling incursions into Gaul. On his return from one of these expeditions (in May, 725), he died a natural death.

Hodheyrah Ibn Abdallah governed Spain until the arrival of Yahya Ibn Salamah, who ruled for two years and a half without making any conquests. He was deposed in 725, and succeeded by Othmán Ibn Abi Nesa, better known to the readers of romance as Munuza.

Othmán, who under the preceding governors had been the scourge of the Gallic provinces, persevered in his attacks, but his authority was only acknowledged a few months, for he was replaced in 727 by Hodheyfah Ibn Al-ahwas, who was himself soon displaced to make room for Alhaïthám Ibn Obeyd. The new amir was accused of cruelty and rapacity, and, at the instigation of the principal officers in the army, was deposed in 728.

Abd-el-rahman, the predecessor of Anbasah, and the same who after the battle of Toulouse led back into Spain the remains of the invading army, was next appointed by the khalif to command in Spain. His new administration was signalised by acts of justice; he punished those local governors who had been guilty of oppression, and restored to the Christians the lands which had been taken from them. In 732 he invaded Gaul at the head of the largest Mohammedan army which had yet trodden the plains of the Continent, and penetrated as far as Tours, where he was met by Charles Martel. The issue of the contest is well known; the Moslems were defeated after a most bloody engagement, which lasted the greatest part of the day: the body of their general and his bravest soldiers remained on the field of battle, and the victorious progress of the Arabs was once more stopped in the heart of France (733).

Of the succeeding governors of Mohammedan Spain, viz. Abd-el-malek Ibn Katn, who arrived from Africa and held the reins of government for three years, until he was deposed; Okbah Ibn Al-hejáj, who kept it until 741; Balkh Ibn Basher, Thaalebah, Husám Ibn Dherár, and Thuebah, little is known except that through their private quarrels and interminable feuds the fire of discord was kindled among the Arabian tribes, and that their Spanish empire was brought more than once upon the very brink of ruin.

Yúsuf Al-fehri was the last governor who ruled over Spain in the name of the Eastern khalifs. Elected by the people and the army in 739, his appointment was confirmed at Damascus; he administered the government for nearly ten years, during which Mohammedan Spain continued to be a prey to civil war. Yúsuf had to contend with Samil, Aamir, Huseyn Al-okayli, and other competitors for power.

2nd Period.—Spain under the Sovereigns of the House of Umeyyah. A.D. 756-1036.—*Kings.*—The overthrow of the dynasty of the Beni Umeyyah in the East, and the tragic events by which it was marked, were calculated to have the greatest influence on the destinies of Mohammedan Spain. A descendant of that family, Abd-el-rahman Ibn Muawiyah, escaped from the general massacre of the Beni Umeyyah in 748, and, after wandering for some time in Egypt and Barbary, landed on the coast of Spain in the early part of 755. He was received with open arms by the inhabitants, who detested the yoke of the Abbasides, and after defeating in two pitched battles (May and September, 756) the generals of the khalif, he made his triumphant entry into Cordova, in December, 756. Spain now ceased to be a dependency of the Eastern empire, and continued to be governed by the posterity of Abd-el-rahman, who received the surname of *Ad-dákhel*, or the Conqueror. His reign was long and prosperous. The Christians, profiting by the civil dissensions of the Arabs, had extended their frontiers, but they were now again driven to the mountain fastnesses of Asturias. Cordova, the capital, was enlarged and embellished by Abd-el-rahman, who surrounded it with walls and conveyed water to it. He began the building of the great mosque [CORDOVA], and formed ship-yards along the coast; he is moreover said to have been the first to transplant the palm and the pomegranate into the congenial climate of Spain; and he encouraged science and literature in his states. This good king died on the 29th of September, 788, after a reign of thirty-four years and one month.

Hishám, surnamed *Ar-rádhi* (the benevolent), the youngest of Abd-el-rahman's twenty male children, succeeded to the empire by his father's appointment. His reign, although prosperous, was of short duration. He had to contend with his two brothers Suleymán and Abdallah, who, considering themselves injured by their father's will, tried to enforce their claims by arms; but, being defeated in every encounter, they were soon compelled to make their submission. In his expeditions against the Christians, Hishám was equally successful. He obliged Bermudo the *Deacon*, king of Asturias (791), to sign a most humiliating treaty. His generals (793-4), penetrating far into France, seized on Narbonne, which they plundered and burnt, advanced as far as Carcassone, defeated Duke William, one of Charlemagne's lieutenants, and returned laden with immense booty, the fifth part of which Hishám applied to the completion of the mosque begun by his father. Hishám died in June, 796.

Al-hakem I., surnamed Abú-l-aássi (the father of cruelty), son of Hishám, succeeded his father. His reign was extremely unquiet. No sooner did his uncles hear of Hishám's death than they again asserted their right of primogeniture; but their attempts proved unsuccessful, for Suleymán was defeated and killed near Valencia, in 799, and Abdallah only obtained the royal pardon on condition of residing in Africa. An insurrection at Toledo in 805, and another within the very walls of his capital in 817, both of which he visited with the utmost rigour, prove that he was no favourite with his subjects. In 818, on the pretext of a slight disturbance in one of the suburbs of his capital, he gave orders that it should be razed to the ground, and that the inhabitants, about 40,000 in number, should be transported to Africa, whence a considerable body passed to Egypt and seized on the island of Crete, which they kept until 961. [CANDIA.] After this signal act of tyranny Al-hakem received the surname of *Rabadhí* (he of the suburb). He died in May, 822.

Abd-el-rahman II., surnamed *Al-ausatt* (the middle one), succeeded his father Al-hakem. He had at first to contend against his great-uncle Abdallah, who, leaving his place of confinement in Africa, again tried the fortune of war in Spain. He was however defeated. In his transactions with the Christians, Abd-el-rahman was still more fortunate than either of his two predecessors. Barcelona was retaken from the Franks in 827; a Mohammedan fleet burned the suburbs of Marseille in 839; and he fought with success against the Scandinavian vikingur, who, in 844-5, appeared for the first time on the coast of Spain. His internal administration also is justly commended. He erected works of public utility; mosques and colleges were built, roads made, and canals dug for the benefit of agriculture; he was likewise an enthusiastic lover of science and literature, which he fostered with unexampled liberality. This excellent monarch died, universally regretted, in August, 852.

He was succeeded by his son Mohammed I., whose reign was anything but glorious. At war with his own subjects, he was unable to stop the progress of the Christians, who, under Alphonso III., began to make successful inroads into the very heart of the Moslem dominions. To his hereditary states of Galicia and Asturias that enterprising monarch added the rest of Leon, Old Castile, Estremadura, and a considerable portion of Lusitania. To these military disas-

ters must be added a drought of one year's duration (867), which terminated in a pestilence, an earthquake which swallowed up several towns (881), and another piratical invasion of the Northmen (860-1). His reign lasted 34 years and 11 months. Mohammed died in July, 886, at the age of 65.

His son and successor Al-mundher, being unable to contend with Kalíb, a daring rebel, who in his father's days had been suffered to reign independent in Toledo and the neighbouring districts, was defeated and slain, after a reign of one year and eleven months, in July, 888.

Abdallah, his brother and successor, had not only to contend against the rebel Kalíb, but to take the field against his own sons Mohammed and Kásim. The former he defeated in a pitched battle near Calatrava, in 889. With the latter he was equally successful; after a short campaign he defeated (895) the forces of the two princes, both of whom fell into his hands. Mohammed, the eldest, was confined in a dungeon and strangled by his orders; Kásim was spared. Abdallah died in October, 912, after a reign of 25 years, appointing for his successor his grandson Abd-el-rahman III., the son of Mohammed.

Abd-el-rahman III., surnamed *An-nássir lidin-illah* (the defender of the faith of God), may safely be pronounced the greatest monarch that the Spanish Arabs ever had. When still young, the mildness of his temper, his generosity, and his love of learning had made him the favourite of the people, so that notwithstanding his uncles were in every respect fit for the management of public affairs, his appointment was received by the nation with unfeigned joy. Abd-el-rahman's first care was to purge the country from the rebels, who under the reign of his predecessors had seized on the best districts of the Peninsula. Of these the most powerful was Kalíb, who, assisted by the Christians, extended his sway over the best portion of Mohammedan Spain: he was pursued from fortress to fortress, his army cut to pieces or dispersed, and himself obliged to wander in disguise through the mountains of Aragon, where he met with an obscure death; and although his two sons Suleymán and Jaafar attempted some time afterwards to revive the war, their plans were completely defeated, and Toledo and other cities, which were still attached to their cause, were obliged to capitulate (944).

In his expeditions against the Christians, Abd el-rahman was equally successful. In 938 he gained a signal victory over Ramiro II, king of Leon, and in 940 he defeated, near St. Estevan, that monarch, who commanded his forces in person. His wars with Ordoño II., king of Leon, had the same happy termination. His estates too were considerably increased by the addition of a large portion of Mauritania, and the city of Fez, its capital, which he wrested from the hands of the Idrisites.

Elated by so much success, Abd-el-rahman shook off the yoke which, in religious matters at least, still bound Spain to the East, and assuming the titles of *Amir-el-múmenin* (commander of the faithful), Khalif, and Imám, began to give his unreserved attention to the extension and embellishment of his capital, and to promote the welfare of his subjects. His additions to the great mosque of Cordova, the foundation of the town and palace of Az-zahrá, the endowment of several colleges and schools, the formation of an extensive library within his palace, the construction of roads, canals, and aqueducts, all attest his taste for luxury, his love of the arts, and his unceasing activity.

Of the justice of this sovereign the Mohammedan writers have recorded a striking example. On the appointment of his son Al-hakem to succeed him in the empire, his youngest son Abdallah resented the nomination, and entered into a conspiracy to deprive the favoured brother of his life. The plot however was discovered: Abdallah was arrested, and, notwithstanding the entreaties of his intended victim, condemned to death and executed (950). After a prosperous reign of upwards of 50 years, Abd-el-rahman died, on the 16th October, 961, in the 73rd year of his age.

The vacant throne was filled by Al-hakem II., surnamed *Al-mostanser billah* (he who seeks for the help of God), and who to the many brilliant qualities of his father united an unbounded love for literature. Al-hakem's reign was one of comparative tranquillity; little or no war was waged against the Christians; the family dominions in Africa were protected rather than increased by conquest, so that his whole attention was directed to the promotion of science in his states. His reign indeed has been not inappropriately called 'the golden age of Arabian literature in Spain.' He founded schools, endowed colleges, and by his unbounded liberality attracted to his court the learned of every country. He formed at Cordova a public library called 'the Library of Merwán,' the unfinished catalogue of which is said by the Arabian writers to have filled forty-four folio volumes. Al-hakem died in October, 976, after a reign of upwards of 15 years, leaving for his successor his son Hishám, who was then under eleven years of age.

On the accession of the youthful Hishám II., surnamed *Almuyyad billah* (he who is protected by God), to the throne, Mohammed Ibn Abi Aamir Al-mansúr, who had been his father's wizir, succeeded in gaining the affections of his sovereign and ruling in his name. He confined Hishám to the seraglio, and taking into his hands the administration of the kingdom, he assumed all the insignia of royalty. Indeed most of the Arabian historians have not hesitated to call Al-mansúr a usurper, and to number him among the kings of Cordova. But if his ambition was great, his talents made him equal to the task: he was brave, generous, and just; and his wars with the Christians show that he was gifted with great military talents. During his life he is said to have directed no less than seven and twenty expeditions into the very heart of the Christian dominions, which he seems to have entertained the idea of reducing entirely to the sway of Islám. In 983 he took the important fortress of Gormaz Simancas in 984; Sepulveda in 986. In 987 he took and razed Coimbra, and in 997 he stormed and burnt the city of Leon, the capital of the Spanish monarchy; he went even as far as Santiago, which he took in 985, and penetrated within the very precincts of the shrine of Compostella, the bells of which he sent to Cordova to be melted into lamps for the great mosque.

In Africa too Al-mansúr considerably extended the limits of his empire. The six and twenty years of his administration, or rather reign, constitute one of the most brilliant pages in the history of Mohammedan Spain.

Al-mansúr died in August, 1001, on his return from an unsuccessful expedition, the only reverse during his long career of triumph, some say from grief, others from wounds received in battle, leaving the administration of the realm in the hands of his eldest son Abd-el-malek, who still kept his sovereign in confinement, and ruled as absolutely as his father. But Abd-el-malek did not possess the brilliant qualities of Al-mansúr; in his expeditions against the Christians he was generally unsuccessful, and his internal administration was not good. He died in 1008, in Cordova, probably from the effects of poison, after administering the affairs of the khalifate for six years and four months.

He was succeeded in command by his brother Abd-el-rahman, who, treading in the footsteps of his father and brother, assumed all the power, while Hishám led a profligate life within the walls of the seraglio. But not satisfied with what he held, the ambitious minister aimed at royalty itself. He prevailed upon Hishám, who was childless, to name him his successor; but his rash act was the cause of his ruin, for Mohammed, a prince of the blood, repaired to the frontiers, assembled an army, invested Cordova, and Abd-el-malek having been deserted by his followers, was made prisoner, and crucified by the victor's orders, on the 17th of January, 1009.

The apparent motives of Mohammed's rebellion seemed to be to release his sovereign from the dependence and captivity in which he had been held by the sons of Al-mansúr. But no sooner did he see his authority firmly established, than giving out that Hishám, whom he kept in still closer confinement, was dead, he caused himself to be proclaimed in his stead, and assumed the titles of Khalif and *Mahdi billah* (the directed by God). Mohammed did not long enjoy his usurpation; he had soon to contend against a powerful adversary, Suleymán, also a member of the royal family, who, at the head of the African guard, took the field against him, defeated his troops, and gained momentary possession of the capital in 1009; and although Mohammed re-entered Cordova a few months afterwards, he fell a victim to the fury of the populace, who tore him to pieces, and sent his head to the camp of his rival (Aug., 1010).

Suleymán, surnamed *Almostaïn billah* (he who implores God's protection), administered the affairs of Mohammedan Spain in Hishám's name, although some authors suppose that Hishám was secretly put to death by his orders. But the

power of the Umeyyah dynasty, and indeed of the Mohammedan empire of Spain, was fast decaying. The governors of the provinces, refusing to acknowledge the authority of a capital which became the possession of any daring rebel, refused all allegiance to the sultans of Cordova. The antient inheritance of the khalifs was cut up into a thousand petty kingdoms, which, being isolated and weakened, fell an easy prey to the attacks of the Christians. The throne of Cordova itself was occupied by numerous adventurers. Suleymán was defeated and slain by Ali Ibn Hamud (1016), who was himself assassinated in the bath by two of his Slavonian eunuchs (1017). Al-Kásim, and Yahya, the brother and nephew of Ali, disputed the crown with Abd-el-rahman IV., surnamed *Al-mortadhi* (he who is agreeable to God). Abd-el-rahman V., Mohammed III., who was killed in battle in 1018, and lastly Hishám III., occupied alternatively the throne of Cordova for a space of thirteen years.

With Hishám III. (1031) ended the Khalifate of the West, and the noble race of the Beni Umeyyah, who, with a slight interruption of five years, had occupied the throne of Spain for 251 years, and given a series of seventeen sultans to Cordova.

Third period: 1031-1238. *Independent Kingdoms.*—With the extinction of the khalifate of Cordova, the ambitious local governors throughout the Peninsula threw off the mask, and, asserting their independence, assumed the title of kings. Ibn Abbád rose in Seville; Idris Ibn Ali in Malaga; Elvira and Granada obeyed Habús Ibn Maksán; and Valencia was under the rule of Abd-el-aziz, a descendant of the famous Al-mansúr. Badajoz and the whole of Estremadura were under the dominion of Abdallah Ibn Alaftas; Saragossa, Huesca, and most of Aragon, under that of Al-mondher Ibn Yahya; Ismail Ibn Dhi-l-nún reigned at Toledo; Tehwár at Cordova; and Zohaïr and Khaïran, two Slavonian eunuchs, who had passed their youth in the seraglio of Hishám II., held, the former, Almeria and Murcia; the latter, Denia. Cities, even of the second order, such as Carmona, Algesiras, Albarracin, had also their rulers, and the empire of the Beni Umeyyah was divided into as many kingdoms as there were governments before. To detail the history of these petty dynasties, some of which lasted nearly a century, while others had but an ephemeral existence, would be a long and arduous task. It may be sufficient to say, that after a bloody civil war, most of the smaller states were again blended into one or another of the great kingdoms, and that (at the end of the eleventh century) Mohammedan Spain was divided among Mohammed Ibn Abbád, king of Seville, Yahya, king of Toledo, Al-mostaïn, king of Saragossa, and Omar Al-motawakel, king of Badajoz and part of Portugal.

During this period of troubles and civil war, a considerable portion of Portugal and much of New Castile fell into the hands of the Christians. The kings of Leon and Navarre, and the counts of Barcelona, suspending their own animosities, resolved to share in the spoils of their falling rival. After a siege of three years Toledo was compelled to capitulate, and on the 25th of May, 1085, Alfonso entered the antient capital of the Gothic monarchy. The whole of New Castile soon followed the fate of its capital. Alfonso pushed on his conquests, and was going to invade the dominions of Al-mutamed Ibn Abbád, the most powerful sovereign of Mohammedan Spain, when a religious and political revolution changed the aspect of affairs in the Peninsula.

Empire of the Almoravides, 1099-1146.—Towards the middle of the eleventh century, two men, named Yahya Ibn Ibráhim, and Abdallah Ibn Yásim [ALMORAVIDES], the former a pilgrim to Mecca, where he learnt divinity and jurisprudence, the latter a distinguished theologian, succeeded by their combined efforts in rescuing some of the African tribes who dwelt beyond the chain of Mount Atlas from the state of gross ignorance in which they lived, and in instructing them in the dogmas of religion. Under the pretext that to diffuse a holy religion was among the most imperative of duties, Abdallah easily prevailed upon his obedient disciples to make war upon their neighbours. The surrounding isolated tribes were gradually reduced, and the people united under this confederacy received the name of *Marabitins*, or Almoravides, which signifies men consecrated to the service of God. Abdallah now assumed the title of Amír, and was succeeded by Abú Bekr, who, leaving his native deserts, undertook the conquest of northern Africa. His cousin Yúsef Ibn Táshfín subdued Fez and the greatest part of Mauritania, and in 1073 the power of the Almoravides was universally acknowledged throughout northern and part of central Africa. To this monarch the Mohammedan princes of Spain had recourse when pressed by the victorious arms of Alfonso; and Yúsef, whose ambition knew no bounds, eagerly seized upon the opportunity of extending his conquests. He crossed the strait at the head of a powerful army (Aug., 1086), and meeting Alfonso near Badajoz, at a place called Zalaca, gained over him a signal victory (Oct., 1086), which, being followed by other successes, had the effect of checking the progress of the Christian king. But if the Moslems of Spain were by this timely aid saved from their common enemy, they had soon to lament that they ever invited to their country so dangerous an ally; for, struck by the fertility and pleasing aspect of the Peninsula, compared with his native deserts, the wild conqueror turned his arms against the very people whom he was called to protect, and succeeded, partly by treason and partly by violence, in establishing his supremacy in Spain.

Yúsef, the first monarch of that race, died in Marocco, in September, 1106. He was succeeded by his son Ali, who, in 1108, defeated near Ucles an army of Castilians, and slew the infante Don Sancho, son of Alfonso. In 1118 however, the important city of Saragossa was wrested from the Moslems, and the north of Spain for ever freed from their sway.

To Ali, who died in February, 1143, succeeded Táshfín Ibn Ali, under whose reign the Christians made great progress. Obliged to defend his own kingdom of Mauritania against the attacks of the Almohades (another sect of enthusiastic Africans, who were then contending for power), Táshfín had no leisure to attend to his possessions across the sea, and Spain was left to its own resources. Táshfín died in July, 1145, at Oran, where he was besieged by an army of Almohades.

Ibráhím Abú Ishák, the last monarch of the dynasty of the Almoravides, succeeded his father, but his reign was of short duration. Unable to resist the rising power of the Almohades, who were wresting from him city after city, he shut himself in his capital, the city of Marocco. On the surrender of that place, in 1146, he was brought to the presence of Abd-el-múmen, the general of the assailing forces, and immediately beheaded.

Empire of the Almohades.—Mohammed Ibn Abdallah, a native of Herga in Africa, or, according to some authors, the son of a lamplighter in the mosque of Cordova [ALMOHADES], was the founder of a new religious sect, which, like that of the Almoravides, originated in the deserts bordering on Mount Atlas, and soon spread over the whole of Africa. By making his followers believe that he was the twelfth imám of the race of Alí, and the *Mehedí*, or director, who was to teach mankind the path of salvation, and cause virtue and happiness to reign over the whole earth; by inveighing against the vices and corruption of the Almoravides, and promising Paradise to those who should fall in the contest, he attracted numerous proselytes to his standard. In 1121, after associating with him in the empire a promising youth named Abd-el-múmen, he marched against the Almoravides at the head of considerable forces. In 1122 he defeated their army, commanded by Abú Bekr. In the following year he gained no less signal a victory. Marocco, Fez, and other important cities were subdued in 1125 by his lieutenant Abd-el-múmen, and in 1149 the whole of northern Africa acknowledged the spiritual and temporal yoke of the Almohades.

Mohammed died in 1129. He was succeeded by Abd-el-múmen, who was eager to add the possession of Spain to his African conquest. This was easily accomplished by means of his generals; but as he was preparing to cross the straits and take the command of his African bands against the Christian kings, death surprised him in the month of March (others say May), 1163.

He was succeeded by his youngest son, Yúsef Abú Yakúb, who appears at first to have cultivated the arts of peace. It was he who, in 1171, built in Seville the famous mosque and the magnificent square tower belonging to it, which forms at present part of the cathedral. He also built a bridge of boats on the Guadalquivir. In 1173 he defeated Alfonso VIII., king of Castile, and, after laying the country waste and taking several fortresses, returned victorious to Africa. He again crossed the sea in 1184, and landed in Spain, where he remained until the moment of his death (July or August,

1184), occasioned by wounds received in an engagement near Santarem in Portugal.

Abú Yúsef Yakúb, better known by the surname of Almansúr, landed at Algesiras, and defeated Alphonso III. of Castile in the plains of Alarcos. He then marched against Toledo, the capital, and although he could not reduce it, he took Madrid, Guadalaxara, and all the surrounding territory. Yúsef died in January or August, 1199, leaving behind him the character of an able, brave, and magnanimous prince.

Mohammed Ibn-Abdallah, surnamed *Anndseir lidinillah* (the defender of the religion of God), was the next prince of the race of the Almohades who occupied the throne of Mohammedan Spain, which was every day being reduced to narrower limits. No sooner was Mohammed on the throne than he made a last effort to regain the possession of those countries which had been lost by his ancestors. In May, 1211, he crossed the strait with an army, the largest perhaps that Africa ever poured on the shores of Spain (for we are told that it amounted to several hundred thousand men), and encamped on the summit of that mountainous chain which divides New Castile from Andalusia. He was soon met by the combined forces of the Christian princes and thousands of foreign volunteers, whom a crusade proclaimed by the Pope Innocent III. brought to their help. The day was fatal to the Almohades: they were defeated with dreadful carnage, and the battle of Las Navas may be considered as one which in its immediate consequences involved the ruin of the Mohammedan empire in Spain. Mohammed died in Marocco, in July, 1213, not without suspicion of poison.

The reign of Yúsef II., surnamed Abú Yakúb, who was only eleven years of age on the death of his father, was a scene of continued troubles. He died without issue, in January, 1224. His successor, Abl-málik Abd-el-wahid, lost both life and empire a few months afterwards (1224) at the hands of Abdallah Abu Mohammed, surnamed Al-adel, who himself was strangled in October, 1227.

Almámún Abú Ali was not more fortunate. He had to contend in Africa against his relative Yahya, who disputed the throne with him, and in Spain against an enterprising chieftain, Ibn Hûd by name, who had himself proclaimed king of Mohammedan Spain, and ultimately succeeded in wresting that country from the Almohades. Almámún died in 1232.

The power of the Almohades was now fast declining. Mohammed, the successor of Almámún, strove in vain to re-establish his supremacy in Spain: he was obliged to quit that country, and leave it in the hands of his adversaries, who divided it among themselves. Jomayl Ibn Zeyán held Valencia and the surrounding country; Ibn Húd was obeyed in Aragon and part of Andalusia; and Mohammed Ibn Alahmar ruled despotically over Jaen and the best part of the province of Granada. Occasionally at war with each other, the above-mentioned princes showed their inability to contend with the Christians. Cordova, the proud capital of the Mohammedan empire, surrendered to the victors in June, 1236; Valencia capitulated in September, 1238; Denia in May, 1244; and during the year 1246 all the fortresses on both banks of the Guadalquivir, from Jaen to the gates of Seville, fell into the hands of the Christians.

Mohammed Ibn Alahmar, king of Granada, became the vassal of Ferdinand III., who in 1248, assisted by his powerful subject, wrested from the Moslems the important city of Seville.

Fourth Period. 1238-1492. *Kingdom of Granada.*—By becoming the vassal of Ferdinand, the new king of Granada, Mohammed Ibn Alahmar, insured peace for his dominions as long as Ferdinand lived. However, on the death of Alonso X., surnamed the learned, who succeeded his father in the throne of Castile, a desultory warfare was prosecuted on both sides, which ended in a truce in 1266. Ibn Alahmar died in January, 1273.

He was succeeded by his son, Mohammed II., under whose reign another attempt was made by the Africans to re-establish in the heart of Spain the supremacy of Islám. In 1275 Ibn Yúsef, king of Fez and Marocco, crossed the straits at the head of considerable forces, and at first gained some advantages; but he was soon compelled to retire to his own dominions. Mohammed, king of Granada, likewise attempted to regain part of the territories lost by his father; but after a reign of twenty-nine years spent in continual war with the Christians, he died without accomplishing his object, in 1302.

Mohammed III., surnamed Abú Abdalla, his son and successor, was an unfortunate monarch. He had not only to contend against his own subjects, who revolted at Guadix and Almeria, but to defend his kingdom from the Christians, who, in 1308, snatched from him the important fortress of Gibraltar. On his return to Granada, after an unsuccessful attempt to relieve Almeria, which the king of Aragon had invested (1309), he was the victim of a popular commotion, and obliged to resign his throne to his brother Nasser.

The commencement of Nasser's reign was propitious. The siege of Almeria was raised; and Ceuta, which had been in the hands of the Africans, and had become one of the keys of the straits since the Christians held Gibraltar, was reduced by his generals. But the same inconstant mob which had raised him to power, now decreed his deposition. In 1314 the people of Granada rose and proclaimed Ismail Ibn Faraj. Nasser went out against them, but, having been defeated and besieged in his palace, he was obliged to resign and retire into private life.

Ismail Ibn Faraj, surnamed Abú-el-walíd, a prince of the blood, showed great abilities both as a warrior and as a statesman. Although, in 1316, he failed in his attempt to take Gibraltar, he gained (1319) a most signal victory over the Christians commanded by Pedro, Infante of Castile, and his uncle John, both of whom remained dead on the field of battle. Martos and Baza were taken in 1325, and the eastern limits of his empire were considerably extended through his conquests in Murcia. This however did not save him from his internal enemies. Mohammed, a prince of the royal blood, having received an insult from him, swore that he would take revenge; and as Ismail was one day walking with his prime-vizir through the corridors of the Alhambra, he was assailed by a band of assassins, headed by Mohammed in person, and both king and minister fell under the poniards of the conspirators, in 1325.

After the death of Ismail, his son Mohammed IV. was unanimously raised to the throne of Granada. The commencement of his reign was unprosperous. Othmán, the captain of his guards, revolted, and proclaimed Mohammed Ibn Feraj. The Castilians (1328) seized on Vera, Olbera, Ayamonte, and other fortresses; and on the king going out in person to stop their progress, he was defeated, and his army dispersed. The rebel Othmán, who belonged to the royal family of Fez, having obtained reinforcements from Africa, took Algesiras, Marbella, and Ronda. But towards the end of his reign fortune proved more favourable to his arms. In 1329 he retook the important city of Baena, recovered Gibraltar in 1330, and succeeded in reducing all the rebel governors to obedience. However, as he was preparing to cross over to Africa on a visit to Abu-l-hasan, king of Fez, he was assassinated at Gibraltar, in 1333.

Yúsef Abu-l-hejáj, who at the time of his brother's death was at Granada, was immediately raised to the throne. In the words of the Arabian writers, he was the most pacific, the most patriotic, and the most enlightened monarch that ever reigned at Granada. In the intervals of peace he seems to have given his unreserved attention to the reform of the administration of justice, to the encouragement of mechanical and other useful arts, and to the promotion of the general welfare. During his reign the Africans under their king Abu-l-hasan made a last but unsuccessful attempt to plant the banners of Islamism in the centre of Spain. They were met on the banks of the river Salado near Tarifa by the Castilians and Portuguese (Oct., 1340). The Africans were cut to pieces with immense loss, and the Moorish king's wives, together with a rich booty, became the prize of the victors. The loss of Algesiras in 1343, and that of many important towns in 1344, followed this most signal victory, and the limits of the kingdom of Granada were thus considerably narrowed. Like most of his predecessors, Yúsef fell by an assassin. In the month of December, 1352, he was stabbed while at prayers in the mosque by a madman.

Mohammed V., the eldest son of Yúsef, inherited the virtues and the abilities of his father. At peace with the Christians, he gave his entire attention to promote the prosperity and welfare of his subjects, but rebellion, as usual, came to thwart his good designs. Some discon-

tented chieftains, whom the severity of his judgments had displeased, turned their eyes to his brother Ismail, and in the year 1359 attacked Mohammed's palace, massacred the guard, and rushed into the royal apartments. Finding their victim gone, they tumultuously proclaimed Ismail their leader.

Ismail II. did not reign long. Scarcely had he occupied the throne for one year, when he himself fell a victim to the ambition of one of his courtiers, Abú Said by name, who had assisted in raising him to the throne, but who now besieged him in the Alhambra, made him prisoner in a sally, and had him put to death in July, 1360.

The usurper Abú Said did not long enjoy the fruit of his treason. Being at war with Pedro, surnamed the Cruel, king of Castile, and with the dethroned monarch Mohammed V., whose authority was still acknowledged at Ronda and the neighbouring districts, and seeing that he could not well resist both his enemies, he resolved to do homage to the crown of Castile, and to hold his kingdom thenceforth as an hereditary fief. Having obtained a safe conduct, he repaired to Seville with a small escort, and presented himself before the Castilian king. But either the riches which the Moor had with him, even after presenting a considerable portion to Pedro, awoke the avarice of that prince, or, what is more probable, Pedro was in secret intelligence with Abú Said's rival: the fact is, that, in violation of the rules of hospitality, the unfortunate monarch was put to death. This happened in 1362.

By the death of the usurper, the throne of Granada devolved upon the legitimate sovereign. The remainder of Mohammed's life was troubled only by one unimportant revolt, which was speedily repressed. He took Algesiras in 1370, and razed the fortifications. Mohammed died in 1391.

Yúsef II., surnamed Abú Abdallah, succeeded to his father. Scarcely however was he seated on the throne, when he narrowly escaped falling a victim to the rebellion of his son Mohammed, who, by accusing his father of being a friend to the Christians, had succeeded in forming a powerful party. The sedition having been appeased, Yúsef invaded Murcia (1391), but without much success. He was more fortunate in 1394, when the grand-master of Alcantara, who had advanced to the gates of Granada with a body of cavalry, was cut to pieces with his men, and himself slain. Yúsef died in 1395, with symptoms of poison.

No sooner had Yúsef expired, than Mohammed VI., the same son who had conspired against him, seized on the sceptre, to the prejudice of his eldest brother Yúsef, whom he confined in a dungeon in the castle of Salobrena. The first year of his reign he passed at peace with the Christians, and even visited Enrique III. in Toledo; but war having broken out again, through the indiscretion and temerity of the governors of the frontier fortresses on both sides, the Moors took Ayamonte in 1397, and in the following year they defeated a small army of Christians on the banks of the Guadiana. These successes however were more than balanced by the loss of Zahara and other towns, which the regent Ferdinand took from them in 1407. Mohammed died in 1410.

Immediately after Mohammed's death, his brother, Yúsef III., was released from his confinement and placed on the throne. He governed the kingdom with comparative tranquillity, and for a period of 14 years, during which peace was only interrupted once, in 1416, when the Christians under the Infante Don Fernando took possession of Antequera. Yúsef died in 1424.

Mohammed VII., surnamed Al-yaiseri, or the left-handed, succeeded his father Yúsef. His first care after taking the reins of government was to renew the truce with the Christians, a circumstance which, united to his haughty and overbearing temper, made him exceedingly unpopular with his subjects. Having moreover prohibited some favourite public amusements, he became so odious, that an insurrection broke out at Granada, his palace was invested and forced, and he had to escape to the court of his kinsman, the sultan of Tunis, in 1428.

The vacant throne was filled by Mohammed VIII. At the head of an army furnished him by the king of Tunis the dethroned monarch appeared the ensuing year in Andalusia, entered Granada, besieged the usurper in his palace, and beheaded him in 1430. But Mohammed was destined to lose his throne a second time, for Yúsef Ibn Alahmar, a descendant from the first kings of Granada, made an alliance with John II., king of Castile, and, having defeated the troops of his rival in 1435, marched on Granada, and entered the capital without opposition, while Mohammed fled to Malaga for refuge.

Yúsef IV. was immediately hailed king, but after a short and turbulent reign of six months, he died in 1435, and Mohammed, the dethroned monarch, who resided at Malaga, was proclaimed for the third time. Not even then was the unfortunate king suffered to govern in peace, for in 1445 his nephew, Mohammed Ibn Othmin, raised a commotion among the people, seized on the Alhambra, took Mohammed prisoner, and confined him to a dungeon, where he passed the remainder of his days.

The usurper was immediately proclaimed under the name of Mohammed IX., but a new competitor for the throne, whose name was also Mohammed Ibn Ismail, and who was supported by the Castilian monarch, seized on the fortress of Montefrio, and maintained himself there in spite of all the exertions of Mohammed. During four or five years the kingdom of Granada was exposed to all the horrors of a civil war, increased tenfold by the devastating irruptions of the Christians. At last, in 1454, the rebels, who had hitherto kept on the defensive, having received reinforcements from John, king of Castile, marched against Granada, defeated the royal troops, and triumphantly entered that capital, from which the Moorish king was fortunate enough to escape in disguise.

Mohammed X., son of Ismail, was then received without opposition, and reigned for twenty-one years in comparative tranquillity, and without the frequent revolts which had precipitated so many of his predecessors from their thrones. But the existence of the Moorish kingdom of Granada was fast drawing to a close. In 1460 the Christians took Gibraltar, and Archidona, and subdued all the intermediate country; the frequent incursions of the borderers also narrowed considerably the limits of the Moorish kingdom, now bounded by the mountains of Elvira and the sea. A peace was at last concluded in 1463, on condition that the Moorish king should hold his kingdom as a fief of Castile, and pay an annual tribute of 12,000 pistoles in gold. Mohammed died in 1466.

Muley Ali Abu-l-hasan, the eldest son of Mohammed, succeeded him, but the state of affairs grew every day worse. In 1470 the governor of Malaga revolted, and did homage to the king of Castile. Granada, the capital, and even the harem, became the scene of those commotions and discords that hastened the ruin of the Moorish empire. The sultana Ayesha, mother of Abú Abdallah, heir presumptive to the throne, entertained a mortal hatred towards another of the king's wives, a Spanish lady called Zoraya, and mother of two princes. At that time the two powerful states of Aragon and Castile were united, and the doom of the kingdom of Granada was sealed. The taking of Zahara (1481) by the generals of Abú-l-hasan, was the signal of a war of reprisals. The city of Alhama, one of the bulwarks of the kingdom, was reduced in 1482; and the ensuing year several important fortresses opened their gates to the conqueror. In the meanwhile the city of Granada was the scene of popular commotion and civil war. The court was divided into two hostile factions—that of Ayesha and Zoraya, the two wives of Abu-l-hasan. The tribe of the *Thegris* (Zegris) supported the former; that of the Beni Serraj (Abenserrages) the latter; one held the Albayzin, the other the Alhambra; and the streets of Granada were stained with the blood of its inhabitants. Although Abú Abdallah succeeded in dethroning his father in 1483, he was himself taken prisoner by the Christians near Lucena, in April, 1483. Abú-l-hasan regained momentary possession of his capital in 1484, but he was soon disturbed by Abú Abdallah, who, having obtained his liberty again, disputed the throne with his aged father.

At last the people of Granada, leaving the father and son to fight their own quarrels, appointed Abdallah, surnamed *Zagal*, or the brave, to distinguish him from his nephew, called *As-saghir*, or the small, to be their king. In the meanwhile Ferdinand was pushing on his conquests. In June, 1484, he besieged and took Alora and Setenil, and defeated the Moors in two partial engagements. In 1485, Ronda, Marbella, Coïn, &c., fell into his hands: Loxa surrendered in 1486, and the ensuing campaign began by the taking of Malaga. But the successes of Ferdinand did not awake the Moors to a sense of their danger, or induce them

to put an end to their civil dissensions; for, profiting by the absence of Zagal from his capital, Abu Abdalla As-saghir marched upon Granada and usurped the throne.

This monarch, who is better known in the Spanish chronicles by the name of Boabdil, was the last king of Granada. In the spring of 1491 Ferdinand invested that capital, and after a siege of nearly a year, the standard of the cross waved on the red towers of the Alhambra. Thus ended, after many vicissitudes, an empire which had lasted for nearly eight centuries.

Government, Institutions, &c.—The government and institutions of the Spanish Arabs may be said, with very few exceptions, to have been modelled upon the Eastern khalifate. The sovereign, who was the source and depository of all power, possessed entire spiritual as well as temporal supremacy: he administered the government with the advice of his *mexuár*, or council of state; the office of *hajeb*, or prime-minister, corresponded in the nature and variety of its functions with that of a Turkish grand-vizier. The provinces were governed by *walis*, or military commanders; and the administration of justice, for which there was no other base than the Korân and the traditional decisions of the companions of the Prophet, was placed in the hands of the kadis, although the sovereign himself could, in cases of appeal, revoke their sentence. The sultan selected his successors from among his progeny, and not unfrequently associated one of his sons in the empire during his lifetime.

But although the principles of government were the same as in the East, and the vices of Mohammedan constitutions as prominent, yet the position of the Spanish Arabs, surrounded as they were by enemies, contributed to give to their institutions a vigour and solidity which they never possessed in the East. The khalifs of Cordova supported a large military force, always ready to take the field, and a numerous fleet to defend the coast of their empire from any maritime invasion. Agriculture and trade were fostered by means of wise and paternal regulations; population increased at an astonishing rate; and the revenue, which is computed at five millions sterling—an enormous sum for the time—enabled the khalifs of Cordova to surround their throne with a magnificence and splendour unparalleled even in the gorgeous capitals of the East.

Sciences; Literature; Arts.—It is now universally acknowledged in Europe that the Arabs succeeded to the sciences of the Greeks; that at a time when ignorance and barbarism prevailed through every part of the Roman empire, literature and philosophy found an asylum amongst them; and that by a singular revolution in the history of nations, Europe became indebted to her Mohammedan invaders for the first lessons of science and learning. With what ardour and success every branch of knowledge was cultivated in the East, the readers must already have perceived in various articles of the present work [ARABIA; ABDALLATIF; AVEMPACE; ASIA; &c.]; it will now suffice to say, that to the Western Arabs especially, and to their settlement in a corner of our continent, we owe the preservation of most of the sciences cultivated by the Greeks.

The first conquerors of Spain, like those of the East, were a rude and illiterate people. It was not till the times of Abd-el-rahman, the first of the Beni Umeyyah (A.H. 139, A.D. 756), that any attention was paid to the cultivation of letters. That monarch and his successors founded colleges, formed public libraries, encouraged literary pursuits by their example and their liberality, and by their successive efforts the study of the sciences was introduced into their states, and continued to flourish to a later period in Spain than in the East. The limits of this sketch prevent us from taking a complete survey of Arabian literature; we shall therefore omit theology and grammar, the favourite studies of the nation, and make a hasty review of those sciences which the Spanish Arabs cultivated with the greatest success.

Poetry has always been the favourite pursuit of Eastern nations: by the Arabs indeed it was cultivated with an ardour which amounted to a passion, and Arabia is said to have produced more poets than all the rest of the world together. The taste was rather increased than abated in Spain, and the catalogues of Casiri show to what extent the muses were courted, since not only war, love, and satire, but grammar, theology, rhetoric, and even the abstruse sciences often form the subject of their compositions. Their poems consist of idylls, elegies, epigrams, odes, satires, and almost every other species of poetry which we have received from the Greeks and Romans, except epic and dramatic poetry, which they never attempted. Besides these, the Spanish Arabs are considered as the inventors of a sort of idyll called *maushahah* (a word meaning in Arabic 'the variegated'), from the nature of the composition, which is a description in the most vivid colours of a woman, a city, a horse, a flower, or any similar object. The most distinguished among the poets of Mohammedan Spain are, Yahya Ibn Hudheyl and Ahmed Ibn Abd-rabbihi, who flourished in the ninth century; Yahia Ibn Al-hakem Al-ghazzal, who wrote in 940 a poem on the Conquest of Spain by Músa; Abú Tálib of Alcira, who acquired the honorable surname of *Al-mutennábi* (the inspired); Ibn Abdún, who wrote the 'History of the Kings of Badajoz' in verse; Al-muatamed Ibn Abbad, king of Seville; Almunder, king of Saragossa; and the famous Abú-l-walid Ibn Zeydun, whose poems have lately been translated by Mr. Weyers.

The historians of Mohammedan Spain are equally numerous, but their merits are generally not great. The best of them give us meagre statements of facts, unaccompanied by reflection and destitute of method. The most antient is Abú Beker Al-rázi, who flourished towards the end of the ninth century; Ibn Hayyán, who wrote a general history of Spain in 60 volumes; Mohammed Al-modhdhafer, king of Badajoz, who left a history of his own times, equally voluminous; Al-homaydi, who wrote a biographical dictionary of illustrious Moslems; Ibn Bashkuwál of Cordova; Ibnu-l-Abbár of Valencia; and the vizier Ibnu-l-Khattib, who wrote several valuable works on the history of the kings of Granada.

But it was in the physical and experimental sciences that the Spanish Moslems most excelled. From the establishment of the Umeyyah dynasty, the greatest attention was paid to the study of mathematics, and all the other exact sciences. Copies of the works of Dioscorides, Hippocrates, Galen, Aristotle, Apollonius, and other Greek writers, were procured in Constantinople, brought to Cordova, and translated. Among the most eminent professors of philosophy, the following are particularly distinguished: Averroes (or rather Abú Abdallah Ibn Roshd) of Cordova, who died A.D. 1198; Abdelmalek Ibn Zohr (commonly callled Abenzohar); and the famous Ibn Bajeh, or Avempace. Their knowledge of botany was considerable, and likewise that of medicine and chemistry, in both which sciences they made considerable proficiency. In mathematics and the sciences dependent on them, they were still more distinguished. A Spanish Arab, a native of Toledo, named Az-zarkal, improved the astrolabe, and invented an instrument for observing the motions of the heavenly bodies, which was long known in Europe by the name of its inventor.

The useful arts of life also engaged the attention of the Arabs. Agriculture, horticulture, and planting were encouraged by their kings; and the canals and other works for irrigation constructed by them, which are still extant in the plains of Murcia, Valencia, and Granada, sufficiently prove their skill in this branch of art. The mechanical arts and manufactures were likewise carried to considerable perfection. The use of writing-paper was introduced by them into Europe; gunpowder was also improved and first used by them in war; and there is every reason to suppose that to them belongs the honour of the discovery of the mariner's compass.

(Al-makkari's *History of Spain under the Arabs*, and other Arabian MSS. in the library of the British Museum; Conde, *Historia de la Dominacion de los Arabes en España*, 8vo., Mad., 1821; Casiri, *Bibliotheca Arabico-Hispana Escurialensis*, fol., Matriti, 1770; Masdeu, *Historia critica de España*, 8vo., Mad., 1783-97; Cardonne, *Histoire de l'Afrique et de l'Espagne*, 12mo., Paris, 1765; Chénier, *Recherches sur les Maures*, 8vo. Paris, 1787; Andrés, *Dell' Origine, de' Progressi, e dello Stato Attuale d'ogni Letteratura*, 4to., Parma, 1783-97.)

MOORSHEDABAD, one of the districts into which the province of Bengal is divided. Its limits are so ill defined that it is not possible to describe them with accuracy. The district occupies the central part of the province, and is intersected by the Jellinghy river, one of the most westerly branches of the Ganges. The population of the district, in-

cluding the capital, was estimated in 1801 at 1,020,572, about two-thirds of whom were Hindus, and the remainder were chiefly Mohammedans.

The most valuable products of the soil are silk and indigo. The neighbourhood of the capital is the chief seat of the manufacture of wove-silks and taffetas, both flowered and plain, and many other varieties of silk goods are made for internal consumption and for exportation. The land revenue, or Jumma, in 1814 amounted to 18,75,000 rupees (187,500*l.*), and the excise duties realised another lac of rupees (10,000*l.*).

MOORSHEDABAD, the capital of the district, and long the nominal capital of Bengal, is situated in 24° 11′ N. lat. and 88° 15′ E. long., on the Bhagirathi, the most sacred branch of the Ganges, about 120 miles above Calcutta, following the windings of the stream. The city was originally called Mucksoosabad, which was exchanged for its present name in 1704, when Moorshed Khooly Khan transferred to it the seat of his government from Dacca. It is an open town, and the buildings extend on both sides of the river through eight miles of its course. It is a remarkably ill-built town, presenting a great assemblage of mud and straw huts, placed without any regard to order, and intermixed with numerous trees. Near to the river there are a few tolerably good brick houses, and some mosques, but altogether the city may be pronounced one of the meanest in appearance in all India. The most conspicuous building in the town is the residence of the nabob, a modern house in the European style; the old palace is in character with the general aspect of the place.

Moorshedabad, or more properly *Cossimbazar*, a town about one mile to the south, which may be considered its port, is a place of immense traffic, and especially in the rainy season, which affords great facility for water conveyance. At this time the river is crowded with boats bringing and conveying away merchandise: the river is not navigable during two or three of the driest months in each year. The number of houses of all kinds in 1814 was about 30,000, and according to the computation usual in Bengal of eleven individuals to every two houses, the population of the town was 165,000. The city is the head-quarters of a circuit court embracing the surrounding districts of Boglipore, Purneah, Dinagepore, Rungpore, Rajeshahy, and Birbhoom.

MOOSE, or MOOSE DEER. [DEER, vol. viii., p. 351, et seq.]

MORAL SENSE is a name which, occurring first in Lord Shaftesbury's 'Inquiry concerning Virtue,' and afterwards adopted by Hutcheson, has since come to be very generally employed to denote the feelings with which we regard men's actions and dispositions. These feelings are known also by the name of feelings of moral approbation and disapprobation. This last name answers every purpose which is sought in naming, and is at the same time free from the many objections that may be urged against the phrase *moral sense*.

The phrase *moral sense* is objectionable, first of all, because the feelings for which it is proposed as a name have no analogy whatever to the external senses, from which the phrase is borrowed. The phrase therefore tends to give a wrong notion of the thing for which it is a name, an objection which is of itself altogether fatal to the use of the phrase for the purpose of naming.

But there is yet another objection which is more important than the last. The phrase *moral sense*, as well as the phrase *moral faculty*, and the word *conscience* (which is applied only to those cases in which the object of the feelings of moral approbation and disapprobation is one's own actions and dispositions) and other similar phrases and words that might be mentioned, tend to convey a notion of a separate independent principle in man from which he derives directly his moral judgments and feelings. And accordingly the use of these phrases and words has led writers on morals to adopt this notion. The moral sense, or moral faculty, or conscience, is spoken of as something implanted within man by God, through which he instinctively distinguishes between moral good and evil, virtue and vice, and approves of the one and disapproves of the other. The theory that men observe the consequences of actions and dispositions, and that the ideas gotten by this observation are converted by an ordinary process of association into the feelings called the feelings of moral approbation and disapprobation, is rejected as degrading. Now though we were to admit that a man possesses an inward monitor which tells him at once what is right and what is wrong, it is clear at the same time that any one may plead the dictates of this monitor in defence of anything that he may choose to do or not to do, and that others will have no means of correcting this plea. Thus if there is degradation in the other course, there is danger in this. Mr. Bentham has referred all systems of morals founded on a separate independent principle, whether called *moral sense* or *conscience*, or by any other name, to individual caprice, liking or dislike, sympathy or antipathy. (*Principles of Morals and Legislation*, chap. 2, note.)

We quote the following passage from an admirable article in the first number of the 'London Review,' as serving to explain further the erroneous theory to which the phrase *moral sense* has led, and to justify the principle upon which the following article on morals is written. After stating, as a fact in human nature, that we have moral judgments and moral feelings, and that concerning these judgments and feelings there are two theories, the writer proceeds:—

'One theory is that the distinction between right and wrong is an ultimate and inexplicable fact; that we perceive this distinction as we perceive the distinction of colours by a peculiar faculty; and that the pleasures and pains, the desires and aversions, consequent upon this perception, are all ultimate facts in our nature; as much so as the pleasures and pains, or the desires and aversions, of which sweet or bitter tastes, pleasing or grating sounds, are the object. This is called the theory of the moral sense, or of moral instincts, or of eternal and immutable morality, or of intuitive principles of morality, or by any other name; to the differences between which those who adopt the theory often attach great importance, but which, for our present purpose, may all be considered as synonymous.

'The other theory is, that the ideas of right or wrong, and the feelings which attach themselves to those ideas, are not ultimate facts, but may be explained and accounted for—are not the result of any peculiar law of our nature, but of the same laws on which all our other complex ideas and feelings depend: that the distinction between moral and immoral acts is not a peculiar and inscrutable property in the acts themselves, which we perceive by a sense, as we perceive colours by our sense of sight; but flows from the ordinary properties of these actions, for the recognition of which we need no other faculty than our intellects and bodily senses. And the particular property in actions which constitutes them moral or immoral, in the opinion of those who hold this theory (all of them at least who need to be noticed), is the influence of those actions, and of the dispositions from which they emanate, upon human happiness. This theory is sometimes called the theory of utility.' (*London Review*, article 'On the state of Philosophy in England,' vol. i., p. 172.)

A masterly exposition of the objectionableness of the phrase *moral sense*, and of the theories that are founded upon it, will be found also in Mr. Austin's 'Province of Jurisprudence determined.'

MORA'LES, AMBROSIO, a Spanish historian and antiquarian, was born at Cordova, in 1513. His father Antonio was an eminent physician, whom Cardinal Zimenez appointed principal professor of philosophy at Alcala, and to whom the marquis of Priego presented the house which tradition pointed out as the one that Seneca had inhabited, in order, said the donor, that it might become again the dwelling of the wisest Cordovan. Ambrosio had for his maternal grandfather Fernan Perez de Oliva, who left him a valuable source of information in his geographical work, 'Imagen del Mundo.' Another Fernan Perez de Oliva, who was Ambrosio's maternal uncle, and a professor of philosophy and theology at Salamanca, took a prominent part in his education. He was also indebted to Juan de Medina, and to Melchior Cano, two great writers and eloquent professors of divinity of that time, the former at Alcala, the latter at Salamanca, where he was the great antagonist of his eminent colleague Bartholomew Carranza, and a still greater opponent of the Jesuits. This Cano or Canus is the author of the excellent treatise 'De Locis Theologicis,' and was a great reformer of the schools, from which he banished many futile and absurd questions.

While yet a youth, Morales produced a translation of the Pinax or Table of Cebes. But a religious enthusiasm rose

far above all his literary aspirations, and pervaded all his actions.

At the age of nineteen, Morales became a Jeronymite, when his religious fervour being no longer controllable, in order to secure himself against temptation, he attempted to follow the precedent of Origen. The excruciating pain inseparable from this self-mutilation drew from him a shriek which brought a brother monk to his cell in time to give him effectual aid. In order to obtain a papal dispensation for his conduct, he set out for Rome, but fell into the sea, and was saved, according to his own account, by a miracle. Considering this accident as a warning not to proceed, he joined his friends at court, and lived thenceforward as a secular priest. After the death of his father, he became a professor at Alcala, where he had, among others, Guevara, Chacon, Sandoval, and the first Don Juan of Austria, among his pupils. He sustained the high literary credit of his family by his investigations into the antiquities of Spain. He began to collect materials in 1541, and to arrange them in 1560. On the death of his friend Florian de Ocampo, he obtained the vacant place of royal chronicler; but his first appearance as an author was in defending the historian Zurita. When the relics of Justus and Pastor were translated to Alcala, Morales was called upon to record that event and the ceremony on the occasion, together with the martyrdom of those saints. On the death of the chronicler Castro, he was sent to inspect his papers, as belonging, in virtue of his office, to the king. The following year he had to examine the Codex Albeldensis, which was a collection of councils given to Philip II. by the Conde de Buendia. At the death of the bishop of Plasencia, the collector of MSS. for the Escurial, Morales succeeded him in that office, which he exercised with zeal and discrimination. He made indices to his fresh acquisitions, such for instance as the Codex Emilianensis, another collection of councils.

In the meantime he extended the 'Coronica general de España,' which Ocampo had carried no further than the death of the Scipios. After he had continued the history to the end of the Gothic period, Morales was sent to Leon, Galicia, and Asturias, to examine sepulchres and temples, archives and libraries: he collected much curious matter which was published from the original MS. in the Escurial, by the antiquarian Florez in 1765, and has been since inserted in the complete collection of Ambrosio's works, Madrid, 1791-2. It was important to explore all those places, in which alone information could be obtained as to the restoration of the Gothic kingdom, and the centuries immediately following; papers and documents belonging to less antient times might be found everywhere, since by the reconquest of Toledo the Moors were soon driven to southern Spain. In his 70th year (1583) Morales finished the third volume of his history, which completed the work to 1037. By way of relaxation he printed a volume of the works of his uncle Fernan Perez de Oliva; and he inserted at the end of it fifteen essays of his own, his juvenile version of Cebes, and an exposition of Don Juan of Austria's device. The Inquisition suspended the publication of this book till certain passages in his uncle's works should be corrected, but as the Inquisitors neglected to make the corrections, the work remained unpublished. The late editor of Morales had a copy before him; and the pieces of Morales himself are included in the last and the only complete edition of his writings. In his seventy-second year he recast his favourite manual, 'Arte para servir a Dios,' the production of an unlettered Franciscan, Alonso de Madrid, adhering however as closely as he could to the mode in which the subject had been treated. In spite of its religious merits, Morales could not help wishing the work had been in better Spanish, and accordingly he undertook the labour of amending the language. He died in 1591, in his 78th year, and was buried at Cordova pursuant to his directions. Cardinal Sandoval, his pupil, erected a fine monument to his memory, which was not completed till after his own death. Southey has expressed a high opinion of the works of Morales, though he blames at the same time his religious enthusiasm.

Ambrosio is the Leland of Spain, but, happier than Leland, he lived to make use of the materials which he collected, and he brought down the history of his country from its early Roman period (where Ocampo had left off) to the middle of the eleventh century. He accomplished this task with great fidelity and industry, though the reader may smile at his credulity. There is perhaps no historian whose personal character is better developed in his works, a circumstance which gives them a particular interest. Although any good historian of Spain must be more indebted to Morales than to any of his predecessors, it has been wrongly supposed that Garibay drew much from Morales. Estevan de Garibay y Zamalloa wrote first, and Morales himself praises Garibay's diligence in consulting documents, and commends the good use which he made of them. This testimony is honourable both to Garibay and Morales, since both had pursued the same course of research among the archives and the deeds belonging to monasteries and churches.

MORA'LES, CRISTOBAL, or CRISTO'FORO, a great Spanish singer, who, about the middle of the sixteenth century, became the most eminent composer at the Roman Pontifical chapel. His masses and other sacred musical works were standard compositions till they were superseded by those of Palestrina, who followed soon after.

MORA'LES, LUIS, surnamed 'El Divino,' from having devoted his pencil exclusively and most successfully to sacred subjects; in which respect however he is far from standing alone among the numerous Spanish painters. His Saviours and Magdalens exhibit the extreme of human suffering endured with a celestial meekness. The same works badly imitated, or rather caricatured, by his son and several scholars, have created a prejudice against Morales, such performances having been imputed to him either ignorantly or wilfully. Thus Pacheco ('Arte de la Pintura') considers him as a man who had a reputation which he did not deserve. Also Palomino, by whom Bryan (*Dict. of Paint.*) has been misled, has affirmed that Morales never drew the human figure at full length. He must have done it however in some cases, according to the description of Morales's principal works given by the industrious Cean Bermudez (*Diccion. de Profesor. de Bell. Art. en España*). This tasteful and judicious critic moreover finds in Morales correct design, knowledge of the naked form, a fine gradation of tints, and the most perfect expression of sorrow, or true Christian grief.

Philip II., passing through Badajos on his return from Lisbon, in 1581, relieved Morales, who was then suffering from poverty and old age, with a yearly pension of 300 ducats. He thus made some slight amends for having dismissed him, and refused to employ his talents at the Escurial, after Morales had gone there by the king's express command. Morales was born at the beginning of the sixteenth century, at Badajoz, where he died, at a very advanced age, in 1586.

MORALITIES, or MORAL PLAYS. [ENGLISH DRAMA, vol. ix., p. 427.]

MORALS is a word used in several different senses, which it is desirable to distinguish. 1. It has been employed, together with the expressions *moral philosophy* and *moral science*, to denote the whole field of knowledge relating primarily to the mind of man; and in this sense it is coextensive with the word *metaphysics*. To this use of the word there are many objections; and it has accordingly now almost entirely ceased. 2. *Morals*, as well as the expressions *moral philosophy* and *moral science*, denotes specially the science of what is called man's duty, what he ought and ought not to think, feel, say, do. In this sense of the word, morals is one department of metaphysics; mental philosophy, or mental science, or psychology (which, as we shall see presently, is a necessary foundation for morals), being another department. This is in every way the most convenient use of the word, and is now generally sanctioned by custom. In this sense of the word *morals*, it is convertible with *ethics* and with *deontology*, a word which, coined by Mr. Bentham, is more apposite to the subject-matter of the science it denotes than any word derived either from the Latin *mos* or the Greek *ethos* (ἦθος), and which has also the advantage of being formed analogously to *psychology*, and to the names of most sciences. 3. *Morals* and *ethics* are at the same time names for the art corresponding to the science which has just been spoken of, the art of performing one's duty, or (as it is generally described) the art of living a good and a happy life. The art and the science being coextensive, and differing only in this, that the same subject-matter is viewed from different points, the indiscriminate application of the same term to both engen-

ders no confusion worthy of notice.* 4. *Morals* is, in current conversation, synonymous with *morality;* thus denoting not only the science and the art, but also what is the subject-matter both of the one and of the other.

It is the purpose of this article to give a brief general account of morals, considered as the science of man's duty.

Morals then is a name for the science which teaches what it is man's duty to do and not to do, or (changing the phrase) what he ought and ought not to do; or again, what it is respectively right and wrong for him to do; or (to resort to yet another change of phrase) which teaches what is respectively virtue and vice. Our account of the science must necessarily commence with an explanation of this, its fundamental idea, which is thus expressed in so many different ways.

It is man's duty to do, or he ought to do, or it is right that he should do, or lastly, that is virtue, which, on the most general view possible of the tendencies of a disposition or an action, conduces most to the happiness of mankind. That which, of any two acts thus viewed, conduces the less to this happiness, it is his duty not to do; or he ought not to do, or it is wrong for him to do, or lastly is vice. So, absolutely and unconditionally, of any disposition or action which tends, on the whole, to cause unhappiness. It is generally stated, in consistency with this explanation, that conduciveness to the general happiness of mankind is the criterion of duty or virtue.

Two questions now arise, to which, before we proceed further, some sort of answer must be given. The answers to these questions will lead us to separate the science of morals from two other sciences with which it is often more or less confounded, viz. mental science, or psychology, and theology, and also to point out the relations in which it stands to these sciences. The two questions are, what does human happiness consist of? and what renders the pursuit of human happiness man's duty?

We shall answer the second of these questions first. It is man's duty to strive to increase the general amount of human happiness, because he knows, both from the adaptation of the external world to that end, and from express revelation of God's will, that God desires the happiness of mankind. The full and detailed establishment of this proposition belongs to theology, in its two departments of natural and revealed religion. Thus is morals connected with theology. We have said that their provinces have been often more or less confounded, and this has taken place principally in two ways. God having revealed, in a general manner, the assignment of rewards and punishments in a future life to the performance of duty and its violation in this, some writers, as Paley for instance, have directly referred virtue to an expectation of these rewards and punishments, and, instead of treating them as something extraneous and accidental, have introduced them as essentials into the definition of morality.† Now morals has nothing to do with these rewards and punishments further than to determine what are the dispositions and actions to which they are respectively assigned; and this is determined altogether independently of the rewards and punishments themselves. The other way in which the provinces of morals and theology have been confounded (and here the confusion is complete) is by deriving all duty directly from the revealed will of God. Those who consult the Bible only, as being the depository of God's revealed will, for a complete enumeration of their duties, clearly reject morals as an independent science, and merge it entirely in theology. It is needless to observe that the Bible, which, as Mr. Burke observes in a well-known passage, 'is not one summary of doctrines regularly digested, in which a man could not mistake his way,' cannot take the place of, any more than it can be superseded by, a science which systematically treats duty on the principle of conduciveness to the general happiness of mankind.

* Writers on morals indifferently define it as a science and as an art. Thus (to give an instance of each) Paley defines it as 'that science which teaches men their duty and the reasons of it;' Henry More, in his 'Enchiridion Ethicum,' as 'the art of living a good and happy life' (*ars bene beateque vivendi*).

An able and distinguished writer in the 'London and Westminster Review' denies to morals all claim to the title of a science. 'Morality,' he observes, 'is not a science, but an art; not truths, but rules.' (Vol. iv., p. 10, article on *Political Economy, and on the Method of Philosophical Investigation in that Science*.) In the same way, Mr. Mill, in his 'Analysis of the Human Mind,' wherever he has occasion to speak of morals, speaks of it as an art. It seems to us, that morals is either a science or an art, according to the manner in which it is treated; a science, if its subject-matter is exhibited in the form of propositions; an art, if in the form of rules. It seems to us also, that the fitter way of treating it is as a science.

† Paley's well-known definition of virtue is, 'The doing good to mankind, in obedience to the will of God, and for the sake of everlasting happiness.' This definition is considered by the writer of this article as open to great objections.

The question, what does human happiness consist of? remains to be answered. And here too we can only generally indicate the mode of answering the question, rather than provide in detail the answer itself. Man is so framed as to be susceptible of certain pleasures and certain pains. These pleasures and pains are of two different kinds, physical and intellectual; in the last division being included the pleasures and pains of sympathy, and also those derived from the feelings of moral approbation and disapprobation. These pleasures and pains differ of course among themselves, both in kind and degree. Now generally the greater the number of pleasures gratified, and the greater the number of pains avoided, the more is man's happiness consulted; and when there is a necessity of choice between pleasures and pains of different kinds, this happiness is consulted more, in proportion as the pleasures and pains respectively gratified and avoided are more enduring and extensive in effect. The full enumeration and explanation of all the pleasures and pains of which man is by nature susceptible belongs to psychology, or mental science. Morals, availing itself of the results of this science, proceeds to determine, by a comparison, in each case, of known pleasures and pains, in respect of number and value, the different duties of man.

Much confusion has been made between mental and moral science, first by treating the moral feelings (as they are called), or the feelings of moral approbation and disapprobation, as the immediate object of moral science; and secondly, by supposing these feelings, under such names as conscience and moral sense, to be the only and all-sufficient criterion of morality or duty. The consideration of these feelings, as of all other feelings, belongs to mental science. So far as they contribute to increase the number of human pleasures and pains, their consideration is a necessary preliminary to the treatment of moral science. So far, on the other hand, as the proper direction of these feelings is concerned (which belongs to the act of education), it is clear that the enumeration and explanation of duties should precede. Those writers who, merging altogether moral in mental science, derive all duties from what they call an independent moral faculty, which, by way of making the thing clearer, they name *conscience*, or *moral sense*, or *right reason*, commit the error of mistaking the effect for the cause. So far as the judgments of this conscience, or moral sense, or right reason, are good and proper judgments, so far must they be founded upon the results of moral science, treated, as we propose to treat it, in reference to the principle of conduciveness to the happiness of mankind. And it will invariably be found that whatever of good exists in any moral system professing to be founded on something else is really (though its authors imagine otherwise) derived from this science. But where direct and conscious reference is not made to this science, there is no longer any security for the proper direction of the moral feelings. As Dr. Paley happily expresses it, 'a system of morality, built upon instincts, will only find out reasons and excuses for opinions and practices already established—will seldom correct or reform either.' [MORAL SENSE.]

Thus much in the way of preliminary disquisition. We now proceed to enumerate man's several duties.

It is of course out of the question to give a complete enumeration of single separate duties, or (in other words) to state in detail all that a man ought or ought not to do under all possible varieties of circumstances. This can hardly be expected, or at any rate is seldom professed, and never accomplished, in treatises expressly devoted to the subject. The most at all events that can be done here is to name, with the addition of some brief general explanation, the chief general classes of duties. The adaptation of these general duties to particular cases is often obvious. In some cases, which will be specially noticed, the carrying out into minute detail of general rules of duty opens new and large departments of inquiry, which may be considered either as constituting separate sciences, or as belonging to other sciences rather than to morals.

In thus taking refuge in a general classification of duties we shall have to furnish the reader with a list of *dispositions* which it is the duty of man respectively to cultivate and not to cultivate. A disposition is a tendency in a man to act (under which word is comprehended thinking, feeling, speaking, and doing) generally in a certain way. The names for the different dispositions thus come to embrace general classes of actions. For instance, the disposition

called *benevolence* leads to innumerable actions which, under innumerably different circumstances, it is man's duty to perform; and the name therefore stands as a general name for all these actions. To name singly and separately all these actions would perhaps not be practicable, and certainly not be desirable. Certain subclasses of them may be named, in explaining the beneficial tendency of the general disposition, or (in other words) the reasons why it is man's duty to cultivate this disposition. This last explanation will necessarily comprehend a general view of the advantages of the different actions which the disposition tends to produce.

There are many different principles of classification on which the enumeration of duties may proceed. It is perhaps not too much to say that all duties may be deduced, with a greater or less exercise of ingenuity, as corollaries from any one which has been previously established. Thus Wollaston, in his 'Religion of Nature,' deduces all man's duties from the duty of truth. Hobbes again, in his 'De Cive,' derives all morality from the duty of preserving peace. It is clear that the mode to be adopted of treating the subject, or, in other words, the mode of classifying our enumeration of duties, is a matter entirely of convenience; and, merely as a matter of convenience, we shall adopt the division of duties which has been partly acted upon by Dr. Paley, and which is perhaps the division most generally resorted to by writers on morals.

We shall treat of a man's duties, first, as they regard himself individually, and, secondly, as they regard others. It is necessary to remark, in order to prevent misapprehension, that one duty is a duty towards oneself, and another duty is a duty towards others, not on account of its tending respectively to produce happiness only to oneself or only to others, but simply from the accidental circumstance of oneself in the one case and others in the other being, as it were, the outward object of the action or disposition which constitutes the duty. 'Those acts of ours,' to quote from Mr. Mill, 'which are primarily useful to ourselves, are secondarily useful to others; and those which are primarily useful to others are secondarily useful to ourselves.' (*Analysis of the Human Mind*, vol. ii., p. 234.) Much of the good resulting from the performance of what we call duties towards ourselves consists in our being thereby better enabled to do good to others; and together with the happiness conferred on others by the performance of our duties towards them, is the happiness caused to ourselves by the gratification of our feelings of sympathy and of duty, and the additional security that is gained for the good-will of others towards ourselves.

I. A man's duty to himself consists generally in the preservation of the life with which his Creator has endowed him, and in the improvement, to the greatest degree in his power, of the faculties which he possesses.

The first part of this duty is altogether negative. A man must abstain from wantonly exposing himself to danger, or, in other words, he must be *prudent*, and he must refrain from *suicide*. For when man learns that God has adapted his created world to the production of general happiness, he learns at the same time that life has been given for that purpose; and in foolishly risking or in laying violent hands upon his own life, he tends so far to mar God's object. He throws away his own means of attaining happiness in the way in which God has willed that he should attain it, and he destroys also his means of promoting the happiness of others.

As regards the second part of a man's duty towards himself, consisting in the improvement of his faculties, or, as we may otherwise express it, of his intellectual and moral being, this is partly positive and partly negative. It is a man's duty to improve himself, so far as he can, by study and by cultivating good dispositions; the full explanation of the best mode of doing which belongs properly to the subject of education. It is his duty also not to deteriorate his character by sensual excesses. The vices which he has thus to guard against are principally two, *lust* and *intemperance*; the latter of which divides itself into *drunkenness* and *gluttony*. The names of the two virtues opposite to the two vices of lust and intemperance are *chastity* and *temperance*. The cultivation of these two virtues, or the abstinence from the two corresponding vices, is recommended not only by the good accruing to the individual, but also by the extent to which he is thereby saved from inflicting injury on others.

II. In considering a man's duties towards others, we would adopt the subdivision of duties towards men generally as men, and duties towards men as members of the same society. Those last duties will be again subdivided into duties towards members of the same political society or state, and duties towards members of the same family.

1. The duties towards men generally as men, or towards mankind, may be comprehended under the general names of *benevolence* or *kindness*, *courage*, *sincerity*, and *humility*.

In benevolence or kindness are included *sympathy*, or a general disposition to assist our fellow-men; *pity*, or kindness towards those in distress, and towards inferiors; *generosity* or *liberality*, which, being the disposition to make our own means serviceable to others, turns pity to good account; *gratitude*; and *charity*, in the sense in which it is used by St. Paul, or the disposition to judge kindly of others' conduct. The vices opposed to sympathy, pity, generosity, gratitude, and charity, are *selfishness*, *hardheartedness* or *cruelty*, *avarice*, *ingratitude*, and *malevolence* or *uncharitableness*. *Slander* is one principal form in which the last-mentioned evil disposition displays itself. The cultivation of the virtues comprehended under the name *benevolence*, and the avoidance of the opposite vices, have an obvious and immediate bearing on the happiness of others. At the same time it is not to be forgotten that happiness accrues to the benevolent man himself from the gratification of his natural feelings of sympathy, and that by doing good to others he disposes others to do good to him.

Courage is valuable, as tending to give effect to our benevolence. It must not exist in such excess as to lead a man to adventure a great risk for a disproportionately small object, and must therefore be governed by prudence. Mr. Mill indeed has treated of courage as a particular form of prudence, a mode of treating of it which we cannot think proper.*

Sincerity comprehends *truth* in words and *honesty* or *justice* in conduct. The manner in which the practice of these virtues, or the abstinence from the opposite vices of *lying* and *cheating*, is recommended by general utility, is obvious. Without the general observance of truth and honesty, men would have no confidence in one another, and there would be no safety. The proverb, that 'honesty is the best policy,' pithily expresses the bearing of this virtue on one's own good.†

It remains to speak of *humility*. This is perhaps not so decidedly a virtue as its opposite, *pride*, is a vice. The evil of this vice consists in its tendency to hurt the feelings of others, and to diminish our disposition to do good. Tolerance of others' opinions, and reverence towards superiors in intellectual and moral worth, are forms of humility; and these are dispositions which, when they exist, are fruitful of much good both for oneself and for others.

2. The duties towards men as members of the same political society or state resolve themselves into the general dispositions of *patriotism* and *obedience*. The first is a virtue, the value of which has been often greatly overrated, and which is very apt to degenerate into the failing called *nationality*. But nevertheless it is a virtue. As the general happiness is best pursued by each individual making his own happiness his own chief object, and again by each body of individuals making the pursuit of their own separate interests their chief object, patriotism properly tempered, or the desire to benefit one's own country so long as this is not done in such manner as to injure other countries, is one valuable means of promoting the general happiness of mankind. Of obedience to those who are invested with authority in a state, and to the laws, it belongs to morals to speak only in the most general manner. The filling up of the detail belongs to political science. This

* 'When we perform acts of courage or fortitude, the chance of evil, that is, danger, is incurred for the sake of a preponderant good. If the good were not something more than a balance for the chance of evil, the consequences of the act would not be a balance of good, but of evil. It would therefore be an immoral, not a moral act, and would have no title to the name of courage. . . . . . Courage, in fact, is but a species of the acts of prudence; a class selected for distinction by a particular name; that class in which evils of great magnitude, or rather of a particular description, are to be hazarded for the sake of a preponderant good' (Mill's *Analysis of the Human Mind*, vol. ii., p. 236.)

There is an obvious difference, which Mr. Mill seems strangely to have lost sight of, between courage being governed by prudence, as it unquestionably ought to be, and courage being only a particular form of prudence. We cannot agree with Mr. Mill either in classing courage among the duties owed by a man to himself.

† Kant, in his 'Metaphysic of Ethics' (*Metaphysik der Sitten*), classes the virtue of sincerity among the duties owed by a man to himself. 'A lie is the abandonment and, as it were, the annihilation of the dignity of a man.'

science having determined what laws ought to be enacted, on the ground of conduciveness to general happiness, morals enjoins obedience to them, without reference to their individual goodness, but for the sake of maintaining political society generally, and of preserving to men all the advantages which political society yields.

3. The duties towards others who are members of the same family consist altogether in affection, which manifests itself differently according to the different family relations. Thus we speak of conjugal affection, paternal and maternal affection, filial affection, and fraternal affection. Conjugal affection implies fidelity. The proper exercise of the paternal and maternal affection opens a wide field of discussion; but it may be said generally to show itself best in the proper education of the children. Into filial affection gratitude and reverence largely enter. Fraternal affection differs from friendship only in the peculiar relation under which the feeling exists.

Thus have we given a brief general summary of man's duties. We have said nothing of duties towards God, which are generally made to form a separate division in treatises on morals, because we conceive that these duties, so far as they depend on God's special commands, and thus differ from the duties which we have enumerated, a -d which we come to know by observing their tendency to promote general happiness, belong to the separate subject of religion; in the same way as the duties which depend on positive laws enacted in a political society have been referred to political science. Generally we may say that man ought to entertain feelings of reverence and gratitude to God, by reason of his superiority, and of the blessings which he has conferred upon us. But the duty of entertaining these feelings in this particular case flows at once from the general duties of gratitude to a benefactor and reverence towards a superior; and inasmuch as the application of the general duties to this particular case needs not the assistance of revelation, and involves no essential difference from the application to other cases, there seems no necessity for a separate division.

So also the duty of kindness to the inferior animals must be taken as a corollary from the general duty of kindness which has been inculcated. The pain which we believe that God wills shall not be inflicted upon men, we must believe too that he wills shall not be inflicted on other animals which he has created. The pain of which animals are susceptible we suppose to be of the same sort as that of which men are susceptible; at least we have no means of conceiving any other sort of pain. And inasmuch as no different circumstances are introduced, there is no need for a separate division wherein to treat of our duties towards the inferior animals.

We shall not prolong this article by a list of works on the subject. The greater number of works which are professedly written on morals are, for a reason which has been indicated in the course of the article, in reality works on a part of mental science. Such for instance is the character of that part of bishop Butler's works which is generally spoken of as belonging to the subject of morals. A good treatise on morals and a good history of moral science are both desiderata in our literature. Paley's treatise on Moral Philosophy, which is perhaps on the whole the best that we possess, has many faults both of matter and of arrangement; and the value of Sir James Mackintosh's 'History of Ethical Science,' which enjoys, somehow or other, a high reputation, will best be known by reading Mr. Mill's severe but yet, in our opinion, not unjust criticism entitled 'A Fragment on Mackintosh.'

MORASS. [MARSHES.]

MORATIN, NICOLAS FERNANDEZ (the elder Moratin), was born in 1737, at Madrid, where he died in 1780. Coming shortly after the poetical reformers Luzan and Montiano, he became the practical reformer of the Spanish theatre in the last century. His comedy 'La Petimetra' contains some fine passages, but wants comic power. In his tragedy of 'Lucrecia,' which has greater merit, the style is not always adapted to the dignity of the subject. Neither of these pieces was performed; such was the prejudice against what was denominated French taste. Moratin's three discourses, 'Desengaños al Teatro Español,' drove from the stage, with the aid of an injunction from government, the 'Autos Sacramentales.' Besides remodelling the drama, Moratin was a still more successful restorer of lyric poetry in Spain. His talents and his amiable character soon gained him the friendship of the learned of the time—the Maestro Flores; the minister Llaguno, the translator of the Athalie; the botanist and humanist Ortega; the eloquent Clavijo Fajardo, the translator and annotator of Buffon, and the editor of 'El Pensador,' the best periodical of that time; his own competitors or rivals, as it were, Montiano, Ayala, Cadahalso, and others—in a word, natives as well as foreigners all sought Moratin's friendship. The Arcadians of Rome gave him the name of Flumisbo Thermodonciaco as a fellow-member. In 1764 he published periodically some of his light poetry, under the title of 'El Poeta.' Soon after appeared his didactic poem on the chase, 'La Diana,' which threw into the shade El Piscator Salmantino, Castro, Nito, Cernadas, and many other writers of that class, who were then corrupting the public taste and disgusting the lovers of genuine poetry.

In 1770, through his patron the Conde de Aranda, he overcame the opposition of the anti-reformist performers to exhibiting on the stage his 'Hormesonda,' a tragedy, which is far from being perfect, thought it is the best of his dramas. The same subject has been treated by the living poet Quintana, in his 'Pelago.' This great effort of Moratin encouraged Ayala to write his 'Numancia destruida;' Cadahalso, his 'Sancho Garcia,' and Huerta, his 'Raguel,' in order to support tragedy in her new garb on the Spanish stage. From a like impulse the 'Hacer que hacemos,' 'El Señorito Mimado,' and 'La Señorita mal criada' of young Thomas Iriate or Yriarte, and 'El Delinquente honrado' of Jovellanos, advanced that reform in comedy which Moratin's son Leandro accomplished. Moratin wrote another tragedy, 'Guzman el Bueno,' which contains several fine passages, but it was not performed.

Unassuming and of too retired habits to make his way in the world, totally helpless when brought among place-hunters, Moratin never importuned the great, not even those to whom he had free access. He asked nothing, he expected nothing, and he got nothing. He practised the law merely for the sake of providing for his wife and son. From this uncongenial labour he was at last released by his friend Ayala, who, quitting Madrid for the benefit of his health, selected Moratin as the person best qualified to fill his chair of Poetica, a situation for which these two friends had before been competitors. A poet is hardly at home in the field of practical utility. However by a 'Memoir on the means of encouraging Agriculture in Spain without injuring the breed of cattle,' Moratin attracted the attention of the Economical Society of Madrid, and soon became an active member of it. He always refused to make any application to the Spanish Academy and to that of History to become a member of those bodies. 'What absurdity,' he once wrote to Llaguno, 'to compel an aspirant to literary honours to beg for them, just as a person wanting a place in the Excise has to petition for it.' Accordingly his beautiful canto, 'Las Naves de Cortés,' passed unnoticed when the Spanish Academy crowned a much inferior composition of José Vaca de Guzman.

Many of Moratin's prose writings, and the whole of his interesting correspondence with Bayer, Conti, Llaguno, Cadahalso, and others, have been lost in consequence of repeated searches and seizures of the family papers in Ferdinand's reign. Among them was perhaps his 'Historical Letter on Bull-fights,' proving them to be not derived from the Romans, but peculiar to Spain. This work however is not mentioned by his son Leandro Moratin, in the biographical notice of his father, which he prefixed to the 'Obras Postûmas de Don Nicolas Moratin' (Barcelona, 1821, and London, 1825). This edition is founded on a collection of the author's poetry, which he himself gave in a corrected form, a few months before his death, to his friend Bernascone. Interspersed in it are the following pieces, which have particular merit:—'Las Naves de Cortés,' 'Amor y Honor,' 'Don Sancho en Zamora,' 'Abdelcadir y Galiana,' 'Consuelo de una Ausencia,' 'Fiestas de Toros en Madrid,' 'La Empresa de Micer Jaques Borgoñon.' There is a collection of dramas and other works of Moratin, but it is a very rare book.

Cut off unfortunately in the prime of life, after struggling with the difficulties inseparable from the profession of an author, and boldly opposing the routine established by ignorance and fashion, the elder Moratin nevertheless succeeded in effecting a beneficial change in public opinion and he gave it the sanction of his high moral and intel

lectual character. This was a glory the more enviable and rare inasmuch as it is derived solely from the services which he rendered to his country.

(Signorelli, *Storia Critica de' Teatri*, vol. vi.; *Foreign Review*, 1828, vol. i.; *Obras Literarias de* Martinez de la Rosa, tom. ii.; Salvá's *Catalogue of Spanish Books*, London, 1826.)

MORATIN, LEANDRO FERNANDEZ, son of the preceding, a greater dramatist than his father, and also one of the Arcades of Rome under the poetical appellation of Inarco Celenio. He was born at Madrid, on the 10th of March, 1760, began to versify at six or seven years of age, and obtained at the age of eighteen a second prize or *accessit* from the Spanish Academy for his heroic poem entitled 'Toma de Granada.' In order to obtain this precocious success, he secretly availed himself of the few leisure moments which he could steal from the mechanical occupation of a jeweller, to which his father had bound him, in order to divert his mind from poetry, and save him from the evils of poverty. Fortunately, his daily wages of eighteen reals (about 3*s.* 6*d.* of our money), which he gained by his humble occupation, enabled him, after the early loss of his father, to support himself and his mother. But soon losing her also, Moratin joined an uncle, who was a jeweller of the king, without however discontinuing his intercourse with the learned, such as Melon, and Fathers Estala and Navarrete.

Directed by these distinguished individuals, his muse was further encouraged by the above Society with another *accessit*, for his 'Leccion Poética,' a satire, as it was required to be by the academical programme, against poetasters. It is in fact a short *Ars Poetica*, far more methodical and critical than the previous metrical compilation of rules by 'Juan de la Cueva,' but it has been superseded in its turn by the more appropriate and didactic 'Poética' of Martinez de la Rosa, in 1827.

At the suggestion of Jovellanos, Moratin became secretary to Cabarrus, a high statesman and financier, who was sent, in 1786, by the Spanish government to Paris. On his return in 1789, the young poet chastised, in most humorous and witty prose, the intruders into Parnassus, in his anonymous 'Derrota de los Pedantes,' written in the fashion of the 'Viage al Parnaso' of Cervantes. In the same year, the celebrated minister Floridablanca rewarded his ode to the new king, Charles IV., with a small pension; but he was at last raised to independence by a much greater patron, 'El Principe de la Paz,' the great favourite of both king and queen, once the arbiter of the whole Spanish empire in both hemispheres, and now forgotten, though still living—Godoy. To Moratin's credit, it ought to be remembered, that he never kicked, as so many did, the fallen political lion.

In 1790 he brought out on the stage his play of 'El Viejo y La Niña' (which shows the consequences of great disparity of age in marriages), his first and most felicitous drama. In 1792 followed 'La Comedia Nueva,' or 'El Café,' a very comic satire against stage absurdities and bad taste, which cannot be translated on account of its local and national allusions. About this time Moratin travelled through France, England, Belgium, Germany, Switzerland, and Italy, both to observe society and the art of reflecting it on the stage. He returned in 1796, and in 1798 he published his translation of Hamlet, which is a complete failure. More fortunate afterwards, he produced in 1803 'El Baron' (or the Impostor), which though not one of his best performances, eclipsed the similar piece of 'La Lugareña orgullosa;' in 1804, 'La Mogigata' (a hypocritical young lady preparing herself for the cloister in order the better to carry on her intrigues); in 1806, 'El Si de las Niñas,' the subject of which also is a female who defeats all her mother's attempts at restraint, and the object of her previous instructors. It was represented twenty consecutive days, reprinted four times in the same year, and afterwards translated into many languages.

Elated by his popularity, Moratin was preparing some new pieces, when the suspicions of the Inquisition, which were enviously directed against him, checked his ardour. Although powerfully shielded by Godoy, his 'Escuela de los Maridos,' Moliere's 'Ecole des Maris' (admirably adapted to Spain and modern times), was not represented till the 17th of March, 1812, under Joseph Bonaparte, who made the author chief royal librarian. On the restoration of Ferdinand in 1814, Moratin's property was seized, and himself reduced to actual starvation. Still, before the close of that year, friendship and gratitude, the prominent features of his character, induced him to prepare, for the benefit of the actor Blanco of Barcelona, 'El Medico á Palos,' a piece which was modelled, with proper adaptations, on Molière's 'Médecin malgré lui.' Beloved as he was in that city, the dread of official and concealed persecutors made him leave it in 1817 for Paris, where he lived with his early friend Melon, till the restoration of the popular Spanish constitution in 1820, when he returned to Barcelona. After editing here his father's works in 1821, as stated in the previous article, he left that city again on account of the yellow fever, and went to join his friend Silvela at Bordeaux.

He now devoted himself exclusively to the improvement of his own 'Origenes del Teatro Español,' a work of vast and rare erudition and research, the subject of which is still far from being exhausted, and is discontinued by the author just before the appearance of the exuberant Lope de Vega and his prolific school. At the end of 1825 Moratin's health began to decline. Accompanied by Silvela, he returned in 1827 to Paris, where he died on the 21st of June, 1828, and was buried near Molière's monument in Père la Chaise.

Although a lyric poet of equal genius and more taste than his father, and though he had the credit of having improved the blanc verse (verso libre) so suitable to the Spanish ear, and of having moreover used new combinations of metres and rhymes, Moratin did not consider himself entitled to the double title of a lyric and dramatic poet. A severe correctness, an excessive caution against all flights of imagination, and a strict submission of all other powers to the control of judgment, deprived L. Moratin of that originality and freedom which are necessary for one who would aspire to be a first-rate poet. He is very roughly handled by the *Foreign Quarterly Review* (vol. ii., p. 595), but he is vindicated, *con amore*, by a rival publication, the *Foreign Review* (vol. ii., p. 147). Galiano (*Athenæum*, 1834, p. 371), in his attempt to steer a middle course between the two critics, after acknowledging that L. Moratin 'accurately portrayed the manners and forms of Spanish society,' lowers his plays in rather a summary manner to the level of clever dialogues. But how could the characteristic vivacity and freedom of that society be exhibited in what Galiano calls 'meagre and uninteresting plots?'

Instead of intricacy, the great object of former dramatists, L. Moratin was poetically fond of simplicity, as an element of beauty. Moreover, it was by constant observation in the ranks of middle life that he attained the power of correctly representing the faults and feelings which characterise that class of society. It would be out of place here to touch on the dispute between the classical and romantic schools, in which the two Moratins were involved.

The poetical works of L. Moratin having been purchased in 1824 by his friend Arnao, the greater part of them were published by him at Paris, in 3 vols. 8vo., 1825, and reprinted by the same, in 3 vols. 12mo., in the following year. Part of this collection, 'Poesias Liricas de L. Moratin,' were printed in London by Calero, for Salvá, in 1 vol. 12mo., 1825.

The splendid edition, in three thick vols. 8vo., by the Spanish Academy in 1830, of the 'Obras de Don Leandro Moratin,' was reprinted in 1835, at Barcelona, without the 'Origenes.' This edition of 1830 does not comprehend 'El Auto de Fé Logroño,' which appeared with notes under the name of the 'Bachiller Gines de Posadilla,' nor the following works, which remain in MS.: a translation of 'Candide;' a fragment of his own life; 'Viage á Inglaterra é Italia;' 'Catalogo de todos los Escritos Españoles del género escénico conocidos hasta el dia;' various criticisms of dramatic compositions; abridgement of 'Fray Gerundio;' and his literary correspondence with Jovellanos, Llaguno, Cean, Forner, Signorelli, Conti, and others. All these works were being collected in 1831 for the press, by Salvá and Silvela. Of L. Moratin's dramas, the foundation of his fame, numerous editions have appeared.

(*Obras de* Martinez de la Rosa, vol. ii.; Cortejano, *Juicio Critico de D. L. Moratin*, Barcelona, 1833; Revilla, *Juicio Critico, de D. L. Moratin*, Sevilla, 1833; Brunet, *Supplément du Manuel du Libraire*, Paris, 1834; and C. H. Senior's *Catalogue of Spanish Books*, 1838.)

MORAVIA (in German, Maehren; in Slavonian, Morawa) is a German province of the Austrian monarchy, situated between 48° 40′ and 50° 25′ N. lat., and 15° 10′ and 19° 6′ E. long., including in these limits Austrian Silesia, which extends along the whole north-eastern frontier, and with

which it forms one province. It terminates in a point towards the north, and is bounded on the north-east by Prussian Silesia and Galicia, on the north-west by the Prussian county of Glaz and by Bohemia, on the south-east by Hungary, and on the south-west by Lower Austria. Its area is rather more than 10,000 square miles (of which Austrian Silesia is nearly 1800 square miles). The population in 1830 was 2,060,000, and in 1834, 2,110,140, of whom 470,000 belong to Austrian Silesia. The division of the province is into eight circles, viz. Olmütz, Brünn, Iglau, Znaym, Hradisch, and Prerau in Moravia, and Teschen and Troppau in Silesia.

Face of the Country; Soil; and Climate.—Moravia is divided from Bohemia by a chain of mountains called the Bohemian-Moravian chain; from Prussian Silesia by a part of the Sudetes, called the Gesenke, or the Moravian chain; and from Hungary by the much higher and wider Carpathian range. Moravia is thus shut in by mountains on the east, north, and west: it is open towards the south, in which direction the Morawa takes its course towards the Danube. The interior is traversed by other chains, so that more than half of the country is mountainous. One of the most remarkable of these latter chains is the range extending from Brünn to Olmütz, and thence eastward. It contains numerous caverns and hollows, the best known of which is the Mazocha, sixteen miles north-east of Brünn, a frightful abyss, 300 feet long, 180 broad, and 960 deep, in the midst of a forest. The mountains however enclose fertile valleys, and the lower part of the province, about the centre and towards the south, consists of fine extensive plains, the soil of which is extremely fruitful. The greater part of the country is from 480 to 900 feet above the level of the sea, declining rapidly towards the south. The rivers are numerous: the largest is the Marsch, or Morawa, which gave to the country the name which it has borne ever since the end of the seventh century. This river, the navigation of which is difficult, rises in a cavern at the northern point next to Bohemia and Glaz, flows in a southern course through the middle of the country, receives most of the rivers (excepting a few that run into the Oder), especially the Theya or Taya, and leaving the province at the southern point, from which it forms the boundary between Austria and Hungary, falls into the Danube above Presburg. There are no lakes properly so called, but numerous meres or ponds abounding in fish, of which there are 468 in the circle of Znaym alone, the total surface of which is said to be nearly 100 square miles. Moravia is subject, from the inequality of its surface, to considerable variation of temperature; but notwithstanding its elevation and northern latitude, it enjoys a milder climate than some other countries in the same parallel. The greatest heat in summer is 95°; in winter the mercury sometimes falls to 16° (Fahrenheit). The mean annual temperature at Olmütz is 48°.

Natural Productions.—The animals are horses, oxen, sheep, swine, goats, red deer, hares, feathered game and domestic poultry, especially geese, of which great numbers are exported. With respect to the productions of the soil, Moravia is one of the richest provinces of the empire. Of corn it has on the whole more than sufficient for its own consumption, especially an abundance of very fine wheat. Very large quantities of rye, barley, and oats are grown. Flax is the most important product, and it is nearly equal in quality to that of Prussian Silesia. Hemp is cultivated in the southern part; but the consumption of hemp and of flax is so great, that large quantities of both are imported. Fruit is plentiful and of good quality. The vine flourishes in some parts; and between forty and fifty years ago, so much land was appropriated to the culture of the vine, that the government thought it necessary to interfere, and in 1803 issued an ordinance prohibiting the laying out of new vineyards. The forests furnish vast quantities of timber for building and fuel, potashes, gall-nuts, &c. The pastures are extensive in the mountain districts. The mines are of great antiquity. Formerly some mines of gold and silver were worked, but they were neglected in the troubles of the fifteenth and sixteenth centuries, and have not been resumed. At present iron, sulphur, vitriol, alum, coals, marble, pipeclay (*meerschaum*), and some precious stones, particularly topazes, are produced.

Manufactures and Trade.—The woollen, linen, and cotton manufactures are very flourishing, and on a large scale, and furnish supplies for an extensive export trade to Germany, Hungary, Austria, Italy, and the Levant. The manufacture of thread is likewise considerable. Dyeing is carried on at Brünn, which is particularly celebrated for dyeing Turkish red. Moravia enjoys also the benefit of a great transit trade. The imports are colonial produce, wool, Vienna silks, Russian furs, tallow, wine, oil, porcelain, glass, &c.

Religion, Education, &c.—The inhabitants are partly of Slavonian and partly of German origin, the former being about three-fourths of the whole. In 1825 there were 425,000 Germans, 1,399,000 Slavonians, 27,358 Jews, and 90 Gipsies, all professing the Roman Catholic religion, except 54,000 Lutherans, who have 54 churches; 14,000 Calvinists, with 17 churches; and the Jews, who have 54 synagogues. The Roman Catholics are under the archbishop of Olmütz and the bishop of Brünn: Silesia is under the bishop of Breslau. There is a university at Olmütz, re-established in 1827; gymnasia in every circle, for those who study the higher branches of learning; and about 1500 schools in the towns and the country, in which 130,000 children are educated. The charitable institutions, such as hospitals, asylums for the blind, &c., are numerous.

History.—Moravia was inhabited by the Quadi and Marcomanni during the existence of the Roman empire. When the Quadi went with the Vandals to Spain in 407, the country was occupied by the Scyri, the Rugii, the Heruli; and, about 548, by the Lombards, when a kingdom of Moravia, more extensive than the present province, was established, which was conquered by Charlemagne, who compelled Sampslaus, the king, to be baptized. After numerous vicissitudes, Swiatopluk united all the tribes, and formed a kingdom, which is said to have included not only Moravia, but Bohemia, Misnia, Brandenburg, Pomerania, Lusatia, Silesia, part of Upper and Lower Pannonia, and Dalmatia. This prince died in 894, and was succeeded by his three sons. By dissensions between them, and unsuccessful wars with the Boii (Bohemians) and the Magyars, Moravia was much weakened, and lost its independence in a great battle in 907. It was often a prey to the Hungarians, Poles, and Germans, and after many changes became subject to the kings of Bohemia. In 1527, when the emperor Ferdinand I. succeeded to the crowns of Hungary and Bohemia, Moravia was added to the possessions of the house of Austria, with which it has ever since been united.

There are many considerable and flourishing towns in Moravia, some of which have been already described [AUSTERLITZ; BRÜNN], and others [OLMÜTZ; TESCHEN; TROPPAU; ZNAYM] will be described in their order. There are also other flourishing towns. In the circle of Olmütz is *Sternberg*, a municipal town belonging to Prince Liechtenstein, which is agreeably situated in the mountains, and has 8200 inhabitants, who carry on flourishing manufactures of woollen cloth, linen, canvas, calicoes, and stockings. *Prosznitz*, likewise a municipal town, belonging to Prince Liechtenstein, is situated on the Rumza, in the fruitful district of Hanna, of which it is the chief town. It has four suburbs and several churches. There are manufactures of fine cloth, kerseymere, and linen, several brandy distilleries, and the greatest corn-market in Moravia. The population is nearly 9000. In the circle of Brünn is *Nicolsburg*, the chief town of an extensive lordship belonging to Count Dietrichstein: it has a palace, with a library of 20,000 volumes, a fine cathedral and several other churches, a gymnasium, &c. It has about 7800 inhabitants, of whom about 3000 are Jews. *Eisgrub* has a magnificent palace, the usual summer residence of Prince Liechtenstein, with one of the finest and most extensive parks in Germany, in which there is a celebrated tower in the Oriental style, 218 feet high, the finest orangery in Germany, and an immense collection of exotic trees and plants. Eisgrub has 1800 inhabitants. *Iglau*, the capital of the circle of the same name, is a well-built walled town on the river Iglawa. It has 6 churches, a gymnasium, a well-endowed hospital, flourishing manufactures of woollen cloth and linen, and a great trade, particularly in corn and hops. The population is 14,000. The celebrated fortress of Spilberg, in which State prisoners are confined, is in the circle of Brünn.

(Stein; Hörschelmann; Hassel; Blumenbach; Rohrer; *Oesterreichische Encyclopædie*, &c.)

MORAVIAN MOUNTAINS. [GERMANY.]

MORAVIANS, or MORAVIAN BRETHREN, a congregation of Christians descended from the Bohemian bre

thren, who were a branch of the Hussites. [HUSS, JOHN.] The Bohemian brethren dissented from the Callixtines, and refused to subscribe to the articles of agreement between that party and the council of Basle in 1433. They then formed themselves into a distinct community, called 'the brothers' union,' and as they were obliged to live in seclusion through fear of persecution, they were called by their enemies 'Grübenheimer' or Troglodytes. They looked upon the Scriptures as their rule of faith, rejected transubstantiation, and were very strict in their discipline, excluding the vicious, the scoffers, and the worldly from their communion. They established among themselves a superintendence over the practical and domestic conduct of individuals, who were distributed into three classes, the beginners, the proficient, and the perfect. They had their bishops, seniors, presbyters, and deacons, who administered their civil as well as ecclesiastical affairs. Like the Quakers they refused to do military service.

When the great Reformation took place in Germany, the Bohemian brethren sent envoys to Luther in 1522, who approved of most of their doctrines and discipline, and although he did not admit every article of their confession of faith, yet he said that it might be tolerated as it was. (Mosheim, *Ecclesiastical History*, sixteenth century, iii. 2, 2.)

In 1547 most of the brethren were expelled from Bohemia by Ferdinand I., upon which they took refuge in Poland and Prussia, where they formed several settlements, especially at Marienwerder. They were united for a time with the Lutherans by the convention of Sendomir, but afterwards drew closer to the Calvinists at the synods of Ostrorog in 1620 and 1627, and adopted Calvin's creed, retaining their own Bohemian forms of discipline. (Elsner, *Brevis Conspectus Doctrinæ Fratrum Bohemorum*, in Gerdes's *Miscellanea Groningiana*, vol. vi.)

Under Maximilian II., those brethren who had remained in Bohemia and Moravia enjoyed full toleration, and they formed their chief settlement at Fulnek in Moravia, whence they received the name of Moravian brethren. But in the subsequent Thirty Years' war, their settlements in Bohemia and Moravia were utterly destroyed, and, after various migrations, their descendants were settled, in 1722, by Count Zinzendorf, on his estate of Bethelsdorf in Upper Lusatia, where their colony took the name of Herrnhut, from a hill in the vicinity called Hutsberg. They then established themselves as a new community under the name of the United Brethren, to which Protestants of every denomination were admitted, without being obliged to renounce their respective creeds, but on condition of conforming to their rules of discipline, which were derived from those of the Bohemian brethren. Since that time the community of the United or Moravian brethren has greatly increased, and has spread through Germany, Holland, the United States, and other Protestant countries. Wherever they have formed a new and distinct settlement, they have enforced their regulations of civil and religious discipline upon all the members of the community, but there are many Moravians scattered about in towns among people of different communions, where they form small congregations and have their own meetings. The Moravians do not assume to constitute a separate sect, and whenever they have been required as a body to state their creed, they have professed a general adherence to the confession of Augsburg; and their preachers, without pledging themselves to all its articles, reject any doctrine which is utterly repugnant to it. They avoid discussions on the speculative truths of religion; they acknowledge the manifestation of God in Christ, and consider the life, sufferings, death, and merits of the Saviour as the foundation of their faith. They look upon the Scriptures as the revelation of God. They also believe that the Spirit of God continues to enlighten inwardly those who pray for it for the purpose of regulating their conduct, and they make a practice of invoking it in circumstances of doubt and uncertainty, before coming to a determination. Each community, represented by its elders, presbyters, and deacons, provides for the spiritual wants of its members, for its churches, schools, hospitals, and other public establishments, and the funds for these objects are raised partly by subscriptions and partly by rates levied on the householders. In other respects every family in the community carries on its private affairs, and manages its own interests and property as in other communities. The erroneous notion of their having community of goods arose from the circumstance that some of their first settlers in North America, being few and forlorn among strangers, found it convenient for a time to put their earnings into a common stock.

The principal settlements of the Moravian brethren are—Hernnhut in Lusatia, which is still their head establishment; Niesky, in the same province, where they have a college, as well as at Gnadenfeld in Silesia; Christiansfeld in Holstein; Neuwied on the Rhine below Coblenz, a flourishing settlement in a beautiful situation; Monmiral in the canton of Neuchatel in Switzerland, where they have an institution for boarders; Zeyst near Utrecht; Fulneck in Yorkshire; Fairfield in Lancashire, Ockbrook in Derbyshire; Gracehill in the county of Antrim in Ireland; Sarepta in Southern Russia near Astrakhan; Bethlehem and Nazareth in Pennsylvania, in the latter of which places they have a college; and Salem in North Carolina.

One of the principal objects of the Moravian institution is to send out missionaries among the heathen. They have missionaries among the Caffres and Betchouanas in South Africa, among the Delaware Indians and the Cherokees in North America, among the Eskimaux of Labrador, and among the negroes of the West Indies.

The Moravians are simple and decent in their dress, and, like the Quakers, reject all gaudiness and ornament. Promiscuous assemblages of the two sexes are forbidden among them, as well as plays, games, and dancing. They have however church music and singing. The unmarried men live together in a separate building called the house of single brethren, under the superintendence of an elder; and there are likewise houses for single sisters and widows. Marriages among members of the society must be sanctioned by the elders. They wear no mourning for the dead, looking upon death as a happy release from earthly bonds: their expression on such an event is, that the deceased is gone home to the Lord.

The Moravians in general bear a very good character: they seem to have realised, better than any other Christian congregation, the great Christian principle of peace and charity; they are not exclusive, and the differences which exist among the various Protestant sects seem among them to be smoothed down and almost obliterated. They are not very numerous. In a long and very minute article concerning them in the 'Encyclopædia Americana,' under the head 'United Brethren,' it is stated that there are not more than 14,000 professed members in Europe, and about 4000 in America. But these members are independent of a much larger body of Protestants of various sects, who, without having subscribed their articles of discipline, or forming part of their congregation, either live along with them, or are connected with them, and receive instruction from their preachers, besides the converts whom their missionaries make among the heathen. Cranzen has written a history of the Moravian or United brethren.

MORAY, or MURRAY FRITH, is a gulf of the German Ocean, bounded on the north-west by the counties of Ross and Cromarty, and on the south-east by those of Nairn and Elgin. The north-western shore of the frith extends nearly in a straight line from Kessock ferry, opposite the town of Inverness, to Tarbet-Ness, the north-western extremity of Ross-shire, a distance of thirty-two miles. Midway between these points is the entrance to the frith and harbour of Cromarty, the Portus Salutis of the Romans. The south-eastern shore extends from the town of Inverness to Fort George, and thence to Burghead on the coast of Elginshire. The ports along this shore are merely tide havens. The distance of Burghead from Tarbet-Ness is fifteen miles, which may be considered the width of the frith at its entrance. At Inverness the width is about a mile, and not much more at Fort George, in consequence of the channel being just there narrowed by Chananry Point. The frith extends about seven miles above Inverness, under the name of Loch Beauley. At the head of this loch is the embouchure of the Glass-water, and the north-eastern extremity of the Caledonian Canal unites with it a little to the west of Inverness. Vessels of large burthen come up to Inverness, where the anchorage is safe. The herring fishery of the frith is of great value. In the year 1834 there were 19,956 barrels cured at Banff, the principal part of which had been taken in the Moray frith. The Gaelic name of the Moray Frith is Farar, or Varar; the latter of which names appear in Ptolemy.

(Map of the Shires of Ross and Cromarty in the *New Statistical Account of Scotland*; M'Culloch's *Stat. Acct. of Brit. Empire*.)

MORAYSHIRE. [ELGINSHIRE.]

MORBEYA. [MAROCCO.]

MORBIHAN, a department in the north-west part of France, bounded on the north by the department of Côtes du Nord, on the east by that of Ille et Vilaine, on the south-east by that of Loire Inférieure, on the south and south-west by the Atlantic ocean, and on the west by the department of Finistère. Its form approximates to that of an irregular oval, having its greatest length, from north-west to south-east, from the neighbourhood of Gourin to that of Roche-Bernard, 85 miles; and its greatest breadth, at right angles to the length, from the neighbourhood of Mauron to that of Sarzeau, 52 miles. The islands belonging to the department are not included in the above statements of dimension and site. The area of the department (including the islands, we presume) is given at 2709 square miles, which is considerably above the average area of the French departments; and is rather greater than the area of Lincolnshire, the second of the English counties in respect of size. The population in 1831 was 433,522; in 1836 it was 449,743, showing an increase in five years of 16,221, or nearly 4 per cent., and giving 166 inhabitants to a square mile. In amount and density of population it exceeds the average of the French departments, and considerably exceeds the English county with which we have compared it. Vannes, the capital, is in 47° 39′ N. lat. and 2° 47′ W. long., 244 miles in a direct line west by south of Paris, or 277 miles by the road through Dreux, Alençon, Mayenne, Laval, Rennes, and Ploërmel.

The coast-line in this part of France is very much broken. The southern part of the department is indented by the bay into which the Vilaine flows; on the north side of which bay are several inlets of shallow water, penetrating four or five miles inland. There are also several islands, of which the principal is that of Dumel or Dumet. The Pointe de Penvins forms the north-western boundary of the bay of the Vilaine: this is succeeded by the Pointe St. Jacques and the Pointe du Grand Mont, and the shallow bay of St. Gildas. North-west of this is the narrow entrance to the Morbihan (a word which, in the Lower Breton or perhaps Celtic language, means 'the little sea'), a considerable gulf, land-locked on every side, and extending twelve or fourteen miles from east to west, and six or seven from north to south. It is for the most part occupied by shoals and sand-banks, but there are, between these, channels of deeper water by which vessels get up to Vannes, which is on an inlet on the north side of the gulf. There are a great number of islets in the Morbihan, the principal of which are the Ile aux Moines (Monks' Island) and the isle of Arz; both of these are inhabited, and are under cultivation. Opposite to the mouth of the gulf, a mile or two out to sea, is the little island of Mehan, and farther out the islands of Houat, Hoedic, and Belle-île. Houat and Hoedic are peopled by fishermen; the latter is defended by a small fort. Belle-île is by far the largest island on this part of the coast. [BELLE-ILE-EN-MER.] West of the gulf of Morbihan is the peninsula of Quiberon (antiently Keberoen), a long strip of land running out southward nearly ten miles from the main, and forming with the mainland a capacious bay. The peninsula is insulated at high-water. In it are the three pointes or headlands, Beguenaud, Beguelonuet, and Couguet, the last at the southern extremity. The small fortified town of Quiberon is on this peninsula. In the year 1759 Admiral Hawke defeated the French fleet off Quiberon; and in 1795, during the war which followed the French revolution, a body of emigrants, conveyed and protected by a British squadron, took possession of this peninsula; but not being supported by the population of the surrounding country, they were compelled to surrender, and their principal officers, with the bishop of Dôl, who had accompanied the army, were shot as traitors at Vannes. North-west of Quiberon is the river Etel, a gulf or inlet extending six or seven miles inland, landlocked on every side, with a narrow entrance. North-west of this are Port Louis, or the æstuary of the Blavet, and the æstuary of the Ellé or Quimperlé, with the intervening headland of Tabit or Talut. Opposite to this headland is the isle of Groix or Groaix, extending about five miles in length from north-west to south-east, and about two miles broad. It has about 2000 inhabitants, who gain a subsistence by cultivating the soil, and by fishing for the congers that abound near the surrounding rocks, and salting them for food or sale. The whole length of the coast, with its windings, is estimated at 124 or 125 miles.

The northern side of the department is occupied by the lower slopes of the Monts d'Arrée, part of the great Armorican chain: a range of low hills branching off from these, and running south-east, separates the valleys of the Oust and Blavet. The whole department belongs to the great district of the primitive rocks, which occupies the north-western extremity of France. The only metal procured is iron; some authorities add lead, but there are no lead-mines now wrought. The number of iron-works is five: there are in them six furnaces for making pig-iron, and eight forges for making wrought-iron. The fuel employed is charcoal. Slate is quarried, and rock crystal, potters' earth, and a kind of sand which resembles emery are procured. There are considerable salterns in the marshes along the coast, and a number of mineral springs.

The rivers run from north to south, and from the proximity of the mountains in which they rise to the sea, are commonly small. The Ellé has its source in this department, flows into the adjacent department of Finistère, and at its mouth forms the boundary between the two. The Blavet rises in the department of Côtes du Nord, enters this department on the north side, and flows to Pontivy, where it becomes navigable. From thence it flows south-west into the sea opposite the island of Groaix. Its whole course is about 70 miles, of which 34 miles are navigable. It receives the Evel and the Scorf, the latter just at its mouth, which forms the haven of Port Louis. The Auray and the Artz fall into the gulf of Morbihan. The Vilaine, a more important stream than any of the foregoing, touches the boundary at its junction with the Oust, and after flowing about 5 miles along the border, has the rest of its course (of about 24 miles) within the department. It is navigable in all the part connected with this department. The Oust rises in the department of Côtes du Nord, and entering this department on the north side, flows south-east past Rohan, Josselin, and Malétroit (where it becomes navigable), into the Vilaine: the last six or seven miles of its course are on the border of the department. Its whole length is about 70 miles, for 24 miles of which it is navigable. The Lie, the Trinité (which receives the Duc), the Claye, and the Aff flow into the Oust: the Aff forms for some distance the western border of the department.

The canal from Nantes to Brest enters this department on the east side near Rieux on the Vilaine. The summit-level of the part between the Vilaine and the Blavet has a length of a mile and a quarter; the length of the canal from the Vilaine to the summit-level is about 65 miles, with a rise of nearly 400 feet obtained by forty-two locks. The length from the summit-level to the Blavet is not more than 7 or 8 miles, with a fall of 230 feet obtained by eighteen locks. The canal follows the valley of the Oust to the neighbourhood of Rohan. After crossing the Blavet the canal follows the valley of that river into the department of Côtes du Nord.

The inland navigation of the department is thus given in the Government Returns:—Vilaine, 26 miles; Oust, included in the navigation of the canal from Nantes to Brest; Aff, 4 miles; Artz or Arz, 3 miles; Blavet, 9 miles; upper part of the Blavet, called Canal of the Blavet, 37 miles; Scorf, 9 miles; canal from Nantes to Brest, 80 miles: total 168 miles.

There are seven Routes Royales, or government roads, having an aggregate length of 348 miles, viz. 188 miles in repair, 96 miles out of repair, and 64 miles unfinished. The principal road is that from Paris to Lorient, which branches off from the great Brest road at Rennes (Ille et Vilaine), and entering this department on the east side, runs by Ploërmel, Josselin, Locminé, Baud, and Hennebon. Roads run from Vannes to Nantes (Loire Inférieure) by Muzillac and Roche Bernard; to Dinan (Côtes du Nord) and St. Malo (Ille et Vilaine) by Ploërmel and Mauron; to Guingamp and Lannion (Côtes du Nord) by Locminé and Pontivy; to Quimper and Brest (Finistère) by Auray and Hennebon; and a branch of the last-mentioned road runs to Morlaix and St. Pôl de Léon (Finistère), by Plouay, Le Faouet, and Gourin. A road from Ploërmel runs by Malétroit into the department of Loire Inférieure; and roads from Pontivy run to Josselin, to Baud, and to Loudéac (Côtes du Nord). The Routes Départementales have an aggregate length of 191 miles; viz. 122 miles in repair, and 69 miles out of repair: the bye-roads and paths have an aggregate length of nearly 3000 miles.

The air of the department is temperate but moist. fogs

prevail along the coast. The valleys which intersect the hills on the north side of the department are frequently very fertile: and there are extensive plains along the coast, which produce abundant harvests. The wide heaths which are characteristic of Bretagne form more than a third part of the whole department. About 650,000 acres (above one-third of the whole department) are under the plough. The grain chiefly cultivated is rye; but buckwheat, millet, oats, and a little wheat are grown. The grain harvest is about sufficient for the consumption of the department. Turnips, lentils, flax, and hemp are extensively cultivated. There are about 42,000 acres of orchards and garden-ground: the fruit chiefly grown is the apple, and cider is the common drink of the peasantry. There are about 1700 acres of vineyards, from which a little wine of ordinary quality is produced. The woodlands have an extent of about 85,000 to 90,000 acres. The meadow-land comprehends more than 170,000 acres, beside nearly 30,000 acres of heath or open pasture-ground. Strong draught horses, horned cattle, and sheep are numerous. A government stud is kept up at Lanconnet or Langonnet. Bees are numerous, and their honey is considered excellent. The rivers and the coast abound with fish; and the coasts are likewise frequented by great numbers of water-fowl.

The department is divided into four arrondissements, as follows:—

		Area in Sq. miles.	Population. 1831.	1836.	Communes
Vannes	S.E.	633	119,774	125,898	74
Pontivy	N.W.	660	98,976	101,345	45
Lorient	S.W.	773	128,458	133,307	48
Ploërmel	N.E.	643	86,314	89,193	61
		2709	433,522	449,743	228

In the arrondissement of Vannes are—Vannes (pop. in 1831, 8682 town, 10,395 whole commune; in 1836, 11,623 commune) [VANNES], on the gulf of Morbihan; Sarzeau or Sarreau (pop. of whole commune 6126), on a peninsula called the peninsula of Ruis, between the gulf of Morbihan and the mouth of the Vilaine; Muzillac, near the mouth of the Vilaine; Roche-Bernard and Rieux, on that river; La Gacille, on the Aff; Rochefort, on the Artz or Arz; and Questembert (pop. 3561 commune), between Vannes and Rochefort. Sarzeau is chiefly inhabited by fishermen. In the peninsula of Ruis, near the town, are the castle of Suscinion, built by Anne, the last duchess of Bretagne, and the village of St. Gildas de Ruis, of the monastery of which Abelard was abbot. La Roche-Bernard was formerly one of the nine baronies which sent deputies to the states of Bretagne. It is the centre of a grazing district in which many cattle are reared; the inhabitants manufacture pottery and trade in linens.

In the arrondissement of Pontivy are—Pontivy (pop. in 1831, 4112 town, 5956 commune; in 1836, 6378 commune), on the Blavet; Baud (pop. 5120 commune), on the Evel [BAUD]; Locminé, on a small feeder of the Evel; Guemené, on the Scorf; and Le Faouet and Gourin (pop. 3626 commune), on the Ellé or its affluents. Pontivy owes its origin to a monastery founded here, A.D. 660, by St. Josse, brother of Judicael, one of the early kings of Bretagne. The town was in the feudal ages capital of the duchy of Rohan; it consists of two parts—the old town, in which are the remains of a castle belonging to the dukes of Rohan, and the new town, which consists of a few streets. There are fine barracks in the town, a house for the sub-prefect, a prison, and some pleasant promenades. During the Imperial régime the town of Pontivy bore the name of Napoléonville.

In the arrondissement of Lorient are—Lorient (pop. in 1831, 14,396 town, 18,322 whole commune; in 1836, 18,975 commune) [LORIENT]; Port Louis (pop. 2024 town, 2591 whole commune), and Hennebon (pop. 3360 town, 4477 whole commune), on the Blavet; Plouay (pop. 3816), between the Blavet and the Scorf; Auray (pop. 3734), on the river Auray; and Pluvigner (pop. 4534), between the Auray and the Blavet. Port Louis was built by Louis XIII., in an advantageous situation for trade, at the mouth of the Blavet, to which, as well as to the town, the name of Port Louis was given. The town is on a peninsula, and is defended by bastions and a citadel which command the approaches to the town and the entrance of the port. The inhabitants are engaged in trade and in the sardine or pilchard fishery; a good deal of garden-ground is cultivated in the vicinity. During the Revolutionary period Port Louis was called Port Liberté. Hennebon was antiently a place of great strength, and derives interest from the gallant defence made here by Jeanne, countess of Montfort, A.D. 1342, against the forces of Charles de Blois, competitor with her then captive husband, Jean de Montfort, for the ducal crown of Bretagne. [BRETAGNE.] The antient massive walls still remain in tolerable preservation; they are flanked by strong towers, the battlements and machicolations of which are in some places almost entire; one of the antient gates is used as a prison. There is an antient Gothic church at Hennebon, but not within the antient walls. During the Revolution the ecclesiastical buildings which existed in and around the town sustained considerable damage. A large church and convent near the town were almost entirely destroyed; and of the abbey de la Joie, a fine building in the vicinity, only the fortified entrance and some ruins remain. The townsmen trade in corn, hemp, skins, honey, wax, cider, iron, and soap. Auray also possesses historical interest; here was fought (A.D. 1364) the battle which closed the struggle of De Blois and De Montfort for the duchy. [BRETAGNE.] The town is prettily situated at the base of an eminence, on which are the ruins of an antient fort. Many interesting buildings and religious houses were destroyed during the Revolution. There is a Carthusian convent near the town, where repose the remains of some of the royalists who perished in the expedition to Quiberon: a monumental slab is inscribed to their memory. The altar of St. Anne in this convent is much resorted to by the neighbouring peasantry. Near Auray, on the coast, is the great Celtic monument of Carnac. [CARNAC.]

In the arrondissement of Ploërmel are—Ploërmel (pop. in 1831, 2271 town, 4851 whole commune; in 1836, 5207 commune), and Mauron (pop. 4229), on the Due; La Trinité, on the river La Trinité; Rohan, Josselin (pop. 2485 town, 2654 whole commune), and Malétroit (pop. 1687 town, 1781 whole commune), on the Oust; and Guer (pop. 3488), on a feeder of the Aff. Ploërmel was formerly a town of consequence; the dukes of Bretagne sometimes held their courts there, and many of them were interred in a Carmelite monastery of which the walls alone exist. Ploërmel was besieged by Henri IV., and the edifices of the town sustained considerable damage. There is a Gothic church connected with an Ursuline nunnery, which has some fine stained-glass windows, and the tombs of two of the dukes of Bretagne, removed hither from the Carmelite convent. The tombs are finely sculptured, and are in a perfect state. There are at Ploërmel a high school and an agricultural society. The townsmen trade in linen, corn, thread, butter, paper, leather, and cattle. Josselin has the picturesque remains of an antient castle, once the residence of Olivier de Clisson; the grey walls are on the summit of a lofty rock overhanging the river. Near the castle are many antient houses and an antient Gothic bridge. The castle received several additions from Anne, the last duchess of Bretagne, but is now fast falling to decay. The town of Josselin is superior in appearance to Ploërmel. The church, which during the Revolution was converted into a stable and much injured, has been restored to its original purpose. It contains the mutilated tomb and effigy of De Clisson. There is another church in the town, half ruined. There is a 'penitentiary house' capable of receiving five hundred persons, designed for those who are desirous of retiring for awhile to meditate upon their sins. Between Josselin and Ploërmel is Mi-Voye (mid-way) heath, celebrated for a combat fought (A.D. 1350) between thirty Bretons and as many English, in which the former were victorious.

The chief manufactures of the department are linens, coarse cloth and other woollens, cotton yarn, lace, paper, and leather. A great quantity of butter is made; and the coasting-trade and the coast-fishery, especially that of the sardine, are very actively carried on. Linens, salt, butter, cider, honey, wax, cattle, hides, tallow, and salt provisions are the chief articles of export.

This department constitutes the diocese of Vannes, the bishop of which is a suffragan of the archbishop of Tours. It is comprehended in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Rennes, and is in the thirteenth military division, the head-quarters of which are at Rennes. It returns six members to the Chamber of Deputies.

In respect of education this department is one of the most deficient in France; the number of young men enrolled in

the military census of 1828-29 who could read and write, was fourteen in the hundred, the average of France being thirty-nine.

In early times this department constituted the territory of the Veneti, by far the most powerful of the maritime states of this part of Gaul. Some portions along the border of the department may have belonged to the neighbouring nations, the Osismii, the Curiosolites, the Redones, and the Namnetes. The Veneti possessed almost the only havens that offered a secure shelter along a considerable extent of coast, and this advantage, with their superior skill in maritime affairs, enabled them to acquire the sovereignty of the nations which frequented that part of the ocean, and to render them tributary. They used vessels of small draught of water, suited to the shallows which they had to navigate, and which took little damage when left aground by the receding tide; while their lofty stern and prow, and the general strength of their construction and equipment, enabled them to ride out the tempests to which they were exposed. In these vessels the Veneti carried on a trade with the British Islands and with other parts. Their towns and strongholds were situated on tongues of land running out into the sea, surrounded by banks and shallows, which, being covered by the flood-tide, admitted of no assault by a land force, and, being left dry by the ebb, kept off the attacks of a hostile navy. Confiding in the extensive confederation of which they were the head, in their nautical skill and in the advantages of their situation, they ventured to bid defiance to Cæsar (B.C. 56). But the extraordinary genius and resources of the Roman general overcame all obstacles, and enabled him to achieve the reduction of the Veneti and their supporters. (Cæs., *De Bell. Gall.*, lib. iii., c. 7-16.) In the Roman division of Gaul, the Veneti were comprehended in the province of Lugdunensis Tertia. The town of Dariorigum, or as it is variously written, Darioritum or Dartoritum, was the capital of the Veneti, and assumed, a little before the downfal of the empire, the name of Veneti. It is represented by the modern Vannes, which has risen from its ruins; but it is probable that the site of the antient town was two or three miles from Vannes, at a place called Darouec.

The post of Blabia or Blavia, mentioned in the 'Notitia,' was probably at the mouth of the Blavet; the Port Vindana of Ptolemy was probably the gulf of Morbihan; and a Roman dock at the entrance has been commemorated by the name Navalo, which its site still retains. Sulis, mentioned in the Theodosian or Peutinger Table, was probably at the junction of the little river Seuel with the Blavet; and Durerie, which is mentioned in the same authority, was probably Rieux on the Vilaine. The Vilaine was called by the Romans Herius, and the islands of Belle-Ile-en-Mer and Houat were probably known as Vindilis and Siata.

In the middle ages this department formed part of Bretagne. [BRETAGNE.]

MORDANTS. [DYEING.]

MORDAUNT, CHARLES, Earl of Peterborough, a nobleman famed for his romantic exploits in the war of the Spanish Succession, as well as for his lettered tastes and personal eccentricities, was the son of John lord Mordaunt, whom he succeeded in his title and estates. He was born in 1658. In his boyhood he served in the navy, but afterwards exchanged that profession for the army, and was present in 1680 at the siege of Tangier. He first obtained historical notice however by the decided part which he took in politics, during the reign of James II., against the despotic government of that king. Passing over to Holland, he attached himself to the Prince of Orange, upon whom he warmly urged the project of the expedition to England; and, on its success, was immediately created, in 1689, earl of Monmouth, a title which he subsequently exchanged for that of Peterborough, as the heir of his uncle, second earl of the latter name. Of the questionable though comparatively unimportant share of the new earl in the political transactions of the reign of William III., a full account may be collected from Bishop Burnet's 'History of his own Time,' but it was only after the opening of the Spanish Succession war that he obtained a more creditable field of action, by his appointment, in 1705, to the command of a naval squadron and body of 5000 English and Dutch land forces, with discretionary powers to act on the coasts of Spain and Italy. Receiving on board his fleet at Lisbon the archduke Charles of Austria, claimant of the Spanish crown, he sailed to the eastern coast of the Peninsula, and entered on a career of daring and successful adventure unparalleled in modern warfare. The capture of Barcelona, the reduction of Valencia, and the gaining over of all the eastern parts of Spain to the cause of the archduke, were among the fruits of his brilliant successes; and there can be little doubt that, if his plans had been followed, Charles might have been seated, for a time at least, on the throne of that kingdom. But the conduct of Peterborough himself was intolerably overbearing and arrogant; and his real services, as well as his presumption, rendered him an object of envy and disgust to the archduke and the other allied commanders. When therefore at length Peterborough petulantly resented the repeated neglect of his counsels, by declaring his intention of quitting Spain, Charles showed an ungrateful readiness to be rid of him.

The remainder of his public life was chiefly passed in hurrying from one court to another, so that he was humourously said to have 'seen more kings and more postillions than any man in Europe.' This spirit of locomotion however was anything but harmless: it engaged him in negotiations for which he had often no authority, and led him frequently to sow the seeds of intrigues, the more dangerous as they were supported by his singular talents, and were designed only to minister to a love of action and of personal display as reckless as his vanity was insatiable. In the struggle of parties, during the last days of Queen Anne, Peterborough, through hatred to Marlborough, sided violently with the Tories, and received the order of the Garter and other dignities and offices. On the accession of George I. therefore he had rendered himself too obnoxious to the Whigs to be employed in public business during their ascendency; and the remainder of his existence, which extended to 1735, was distinguished only by his affectionate intimacy with some of the most eminent literary men of his age—Pope, Swift, Prior, Atterbury, Berkeley, and others.

Gay, volatile, and generous to profusion, and with a mind as full of careless wit and negligent grace as of chivalric courage, ingenious expedient, and adventurous stratagem, Peterborough was equally fitted to dazzle in society and in the field. But, both for civil and military life, his qualities were more brilliant than solid; his best actions were the result of an inordinate passion for fame; and, in the gratification of this pursuit, his means were as unscrupulous as his appetite was greedy. With strong impulses of patriotic feeling, therefore, he was often regardless of his country's good; with the persuasive faculties of a diplomatist, he wanted the dignity and consistency of a true statesman; and with undoubted genius for war, he displayed the qualities of an admirable partisan rather than those of a great general.

A lively sketch of the character of Peterborough will be found in Horace Walpole's 'Catalogue of Royal and Noble Authors.' The political and military actions of his life are to be gathered from Burnet's 'History of his own Time;' from the 'Account of the Earl of Peterborough's Conduct in Spain,' by his physician, Dr. Friend; and from Captain Carlton's 'Memoirs.' A full account of his whole career is contained in the modern compilation of the 'Lives of British Military Commanders.'

MORE, SIR THOMAS, born in Milk-street, London, in 1480, was the son of Sir John More, one of the justices of the court of King's Bench. He was educated at St. Anthony's School in Threadneedle-street, under Nicholas Hart, a person of some celebrity in his day, and about his fifteenth year was placed, according to the custom of the times, in the house of Cardinal Morton, archbishop of Canterbury, where he became known to Colet, dean of St. Paul's, who used to say, 'there was but one wit in England, and that was young Thomas More.'

In 1497 More went to Oxford. He had rooms in St. Mary's Hall, but carried on his studies at Canterbury College (afterwards Christchurch). Here he studied Greek under Grocyn, which was then publicly taught in the university, though not without great opposition. During his residence at Oxford he first became acquainted with Erasmus, who resided there during the greater part of 1497 and 1498, and formed an intimate friendship with More, which continued during the whole of his life. It was also at Oxford that the greater number of his English poems were composed, which, though deficient in harmony and ease of versification, are spoken of by Ben Jonson as some of the best in the English language.

After More left Oxford he prosecuted the study of the

law, first at New Inn, and afterwards at Lincoln's Inn, and soon acquired great celebrity for his legal knowledge. He was appointed reader at Furnival's Inn, where he delivered lectures on the law for three years; and about the same time he also delivered lectures at St. Lawrence's Church in the Old Jewry, on the work of St. Augustin, 'De Civitate Dei.' More was always fond of theology, and for some time thought of taking orders; but he finally relinquished this intention, and was called to the bar, though at what time is uncertain.

More appears to have soon acquired an extensive practice. He was appointed one of the under-sheriffs of London, which at that time was an office of considerable importance, since the under-sheriff was judge of the sheriff's court, which then possessed far greater jurisdiction than it does at present. More was considered one of the most eloquent speakers of his day; and his reputation became so great towards the latter part of the reign of Henry VII., that it is said that there was no case of consequence before any court of law in which he was not engaged as counsel. About the same time he was elected one of the burgesses of parliament, in which he opposed a subsidy which had been demanded by Henry VII. for the marriage of his eldest daughter. In consequence of this opposition More incurred the displeasure of Henry VII., a prince who never forgave an injury; and had not the king died soon afterwards, More had determined to leave the country.

After the accession of Henry VIII., More was called upon to take a still more active part in public affairs. In 1514 and 1515 he was sent, in conjunction with Tunstall, master of the rolls, and afterwards bishop of Durham, to Bruges, on business of considerable importance. In 1516 he was made a privy-counsellor, and received from Henry marks of the greatest favour. So great a favourite had he become, that the king used frequently to come to his house unexpectedly and spend the day with him.

About this time More composed his 'History of Richard the Third,' and his 'Utopia,' the work by which he is most known to modern readers. It is written in very good Latin, and was published first at Louvain in 1516, and afterwards at Basle, in 1518. The object of this work was to delineate More's ideas of a perfect commonwealth, which is placed in the imaginary island of Utopia. The society which is supposed to exist in this island is constructed on the principle that no one in the state shall have a right to separate property, since separate property is said to involve the unequal distribution of property, and thus occasions great suffering to those who are obliged to labour, and mental depravation to those who live on the labours of others. It is difficult to determine whether the opinions expressed in the 'Utopia' are to be considered as More's real sentiments.

In 1519 More resigned his office of under-sheriff, and in 1521 he was knighted, and made treasurer of the Exchequer. He was frequently employed by Henry in various public missions to France and the Netherlands; and he bitterly complains to Erasmus, in many of his letters, of being obliged to leave his friends and his books to discharge what were to him the most disagreeable commissions.

In the parliament which met in 1523 More was chosen speaker, and in the discharge of his duties he offended Wolsey, who endeavoured to injure him in the king's opinion. Henry however still continued to show the greatest marks of favour to More, and, as a proof of his esteem, appointed him, in 1525, chancellor of the duchy of Lancaster.

On the downfal of Wolsey, More was made chancellor, on the 25th October, 1529. He discharged the duties of his new dignity with the greatest impartiality and integrity, and was never accused by his bitterest enemies of any corrupt exercise of power. The only charge ever brought against him was first promulgated by Fox, in his 'Martyrology,' and copied by Burnet, in his 'History of the Reformation.' According to these writers, More was guilty of great cruelty in persecuting the Protestants; but even if this were true, it could not justly be brought as a serious charge against More's character in an age in which all parties that had the power persecuted their opponents. But we have, on the contrary, the testimony of Erasmus, that 'whilst More was chancellor no man was put to death for these pestilent dogmas,' which is confirmed by More's own express declarations in his 'Apology,' published in 1533, after his downfal from power, when he was surrounded by enemies, and his assertions, if false, could have been easily contradicted.

More continued chancellor till the 16th May, 1532. Henry had doubtless advanced More to the chancellorship with the hope that he would assist him in his divorce, and marriage with Anne Boleyn, and therefore pressed him strongly for his opinion on the subject. But More was sincerely attached to the Roman Catholic Church; he looked with a certain degree of horror upon a project which was denounced by the supreme head of the Church, and therefore begged Henry to excuse him from giving an opinion. This was granted for the time; but as it was evident that Henry had determined to effect the divorce, and would soon require the active co-operation of his chancellor, More asked and obtained permission to retire from the office.

From this time Henry, who never seems to have recollected any former friendship when his purposes were in the least degree thwarted, appears to have resolved upon the destruction of his old favourite. More was originally included in the bill of attainder which was passed against Elizabeth Barton and her accomplices; but his innocence in this case was so clear, that his name was afterwards omitted. The court party however soon found an opportunity of gratifying their vindictive master. By a law passed in the session 1533-4 it was made high treason, by writing, print, deed, or act, to do anything to the prejudice, &c. of the king's lawful matrimony with Queen Anne; and it was also provided that all persons should take an oath to maintain the whole contents of the statute. At the end of the session commissioners were appointed to administer the oath, and on the 15th April, 1534, More was summoned before them to take it. This More declined doing, but at the same time offered to swear that he would maintain the order of succession to the throne as established by parliament. In consequence of his refusing to take this oath, More was committed to the Tower; and in the same year two statutes were passed to attaint More and Fisher [FISHER] of misprision of treason, with the punishment of imprisonment and loss of goods. More remained in prison during thirteen months, during which time several efforts were made to induce him to take the oath and also to subscribe to the king's ecclesiastical supremacy; but as he refused to do so, he was, at the end of that time, brought to trial for high treason. He appears to have been indicted under the statute alluded to above, which made it high treason to do anything to the prejudice of Henry's lawful marriage with Queen Anne, and also for refusing to admit the king's ecclesiastical supremacy; and although the evidence against him completely failed, he was found guilty and condemned to death. He was beheaded on the 6th of July, 1535, and met his fate with intrepidity and even cheerfulness.

More's character was singularly faultless. His sweetness of temper and amiable disposition are frequently mentioned by his contemporaries. His piety was unaffected and sincere; and it was his love of truth alone which occasioned his death. In private life his conduct was most exemplary he was a kind husband, an affectionate father, and a faithful friend.

Erasmus, who often visited his house, says, that 'with him you might imagine yourself in the academy of Plato. But I should do injustice to his house by comparing it to the academy of Plato, where numbers and geometrical figures, and sometimes moral virtues, were the subjects of discussion: it would be more just to call it a school and an exercise of the Christian religion. All its inhabitants, male and female, applied their leisure to liberal studies and profitable reading, although piety was their first care. No wrangling, no angry word, was heard in it; no one was idle; every one did his duty with alacrity, and not without a temperate cheerfulness.' (Translated by Sir J. Mackintosh, in *Life of Sir T. More*, p. 15.) More was married twice; first to Jane Colt, the daughter of a gentleman of Essex, who left a son and three daughters; and afterwards to Alice Middleton, a widow seven years older than himself. The last male descendant of Sir T. More was Thomas More, a Jesuit, who was principal of the College of Jesuits at Bruges, and died at Bath in 1795.

The English works of Sir T. More were collected and published at London in 1557, and his Latin works at Louvain in 1556. His letters to Erasmus are printed in the collection of Erasmus's letters published at London, 1642. His 'Utopia' has been translated into English by Robynson,

London, 1551, by Bishop Burnet, and more recently by Arthur Cayley, Lond., 1808.

The Life of Sir T. More has been written by his son-in-law, Roper, who married his favourite daughter Margaret; by his great-grandson T. More; by Hoddeston, London, 1652; by Cayley; and by Sir James Mackintosh, in 'Lives of Eminent British Statesmen,' published in Dr. Lardner's 'Cabinet Cyclopædia.'

MORE, HENRY, was born at Grantham in Lincolnshire, in the year 1614. He was sent to Eton, and afterwards to Christ's College, Cambridge, which he entered at the age of seventeen. At college he devoted himself with great zeal to the study of philosophy. He says himself, 'I immersed myself over head and ears in the study of philosophy, promising a most wonderful happiness to myself in it.' Dissatisfied with all other systems, he found rest for his mind only when he came to the writings of Plato; whence, as he tells us, he learnt that something better and higher than the knowledge of human things constitutes the supreme happiness of man, and that this is attainable only through that purity of mind and divine illumination which raise him to a union with God.

More took his degree of B.A. in 1635, and of M.A. in 1639. He published in 1640 his 'Psychozoia, or the First Part of the Song of the Soul, containing a Christiano-Platonical Display of Life,' which was reprinted in 1647, and, together with some additional pieces, published under the title of 'Philosophical Poems.' He had been elected in the mean time a fellow of Christ's College, and he continued to reside there, performing the duties of a private tutor. His next published work was the 'Conjectura Cabalistica,' written, it is said, at the request of Lady Conway, a Quaker lady, with whom he had formed an intimate friendship, and who at her death left him a legacy of 400*l*. He refused in 1654 the office of the mastership of his college, when his friend Cudworth was consequently elected. He refused also many offers of church preferment, limiting his desires to a life of quiet at Cambridge, and to the pursuit of philosophy. He was one of the first Fellows of the Royal Society. He died in 1687, in the seventy-third year of his age.

More's chief works, in addition to those which have been mentioned, are, 'The Mystery of Iniquity,' 'A Key to the Revelations,' 'Enchiridion Ethicum,' 'Enchiridion Metaphysicum,' 'An Apology for Descartes,' and 'The Immortality of the Soul.'

'More was strongly under the bias of the opinion so common among his contemporaries, that the wisdom of the Hebrews had been transmitted to Pythagoras, and from him to Plato: and consequently that the true principles of divine philosophy were to be found in the writings of the Platonists. At the same time he was persuaded that the antient Cabalistic philosophy sprung from the same fountain, and therefore endeavoured to lay open the mystery of this philosophy by showing its agreement with the doctrines of Pythagoras and Plato, and pointing out the corruptions which had been introduced by the modern Cabbalists. The Cartesian system, which sprung up at this time, was embraced by More, as on the whole consonant to his ideas of nature; and he took much pains to prove that it was not inconsistent with the Cabbalistic doctrine. His penetrating understanding however discovered defects in this new system, which he endeavoured to supply. In short the writings of this great man, though not without a deep tincture of mysticism, are eminently distinguished by profound erudition, an inventive genius, and a liberal spirit.' (Enfield's *Hist. of Philosophy*, b. viii., c. 3, s. 3.)

MORE, HANNAH, born 1745, died 1833, a lady who gained no small share of distinction in the world, and for many of the latter years of her life an extensive and powerful influence, by her numerous writings and by her exertions in other ways to improve the moral and religious character of her country. She was the daughter of a village schoolmaster, one of the humbler persons of his class, who had the care of the charity-school at Stapleton near Bristol, but who, some time after the birth of his daughter Hannah, removed to Bristol, where he had a private school. There were other daughters, and the family soon began to be taken notice of as one in which there was a display of talent that was unusual, so that some exertions were made by persons to whom they were known, and the sisters became early in life established in a school for the education of girls, which continued for many years the most flourishing establishment of the kind in the west of England.

Hannah was from the beginning the most remarkable of the group. She wrote verse at a very early age, and in 1773 was prevailed upon to publish a pastoral drama, which was entitled 'The Search after Happiness.' In the next year she published a regular tragedy on the story of Regulus, and two Tales, in verse, and her turn being then thought by her friends to incline to the drama, means were taken to obtain an introduction for her to Garrick, by whom she was very kindly received. This introduced her to the acquaintance of Dr. Johnson, Burke, Sir Joshua Reynolds, and other persons who at that time formed what was considered the best literary society of London. During this period of her life she produced two tragedies, 'Percy' and 'The Fatal Falsehood,' with other poems.

Such was the beginning of the life of Miss Hannah More. But educated as she had been with a deep impression of the truths of the Christian religion, the life which she now led began to appear to her as something unlike that which befitted a creature with such glorious prospects before it as those which Christianity opens to man. She therefore determined on forsaking the drama and retiring from London to devote herself to a life befitting better, as she thought, the child of God and heir of immortality. In this her transitive state she produced her 'Sacred Dramas,' a publication more favourably received perhaps than her former works. By the year 1786, when she was full forty years of age, she had effected her plan for retiring into the country. She chose the part of the kingdom, Gloucestershire and Somersetshire, in which she had been best known in her youth, and there the rest of her long life was passed in circumstances made easy by the profits of her various publications, which were considerable, and in the enjoyment of the pleasures which arise from literary exertion, and from efforts to raise the condition, by means of education, of the labouring population.

We cannot undertake to enumerate all the publications of Miss More in this the larger of the two portions into which her life may be divided. But we shall mention most of them. The work in which the serious turn which her mind had taken first manifested itself was her 'Thoughts on the Manners of the Great,' 1788; which was followed in 1791 by her 'Estimate of the Religion of the Fashionable World.' In 1799 appeared her 'Strictures on the Modern System of Female Education.' Not long after the appearance of this work there was an intention, which Porteus, then bishop of London, is supposed to have greatly promoted, of committing to her the education of the Princess Charlotte of Wales. This however was not effected, but it led to the publication of her 'Hints towards forming the Character of a young Princess,' 1805. Then came what has perhaps been her most popular work, 'Cœlebs in Search of a Wife,' very entertaining as a novel, and full of striking remarks on men and manners, and in which we find fully displayed the kind of character which, to the mind of Miss More, it appears desirable that our young countrywomen should possess. In 1811 her 'Practical Piety' appeared; in 1812 her 'Christian Morals;' in 1815 her 'Essay on the Character and Writings of Saint Paul,' a far bolder undertaking than any in which she had previously been engaged, and if she failed to satisfy those who wish to see so grand a subject treated by a masterly mind, full as it must be of various learning and possessing the powers of a rare discrimination, and of literary analysis, such as is rarely granted, she has failed only where no one hitherto has been successful.

We ought not to omit that she was the writer of one of the first of what were called the 'Cheap Repository' tracts. She called it 'The Shepherd of Salisbury Plain.' It may be regarded as, if not the best, one of the best of its class.

Age had now come upon her with some of its infirmities. In 1828 she left Barleywood, the place in which many years had been spent, and took up her abode at Clifton. Here she continued till her death on the 7th of September, 1833, with very many to honour her and many also to love her; who looked up to her as one of the great reformers of the manners of English society, one who had asserted very successfully the right of Christianity, or, in other words, the right of the Christian scriptures to have a larger share than it had been the wont to allow them in forming the character and directing the course of human beings while in this state of their probation. She was buried at Wrington, near to the grave of Locke.

MORE'A, the antient Peloponnesus, a large peninsula

forming the southern part of Greece, and united to the mainland by the isthmus of Corinth. Its shape has been compared to that of a mulberry leaf, and its coast, being deeply indented by numerous gulfs and inlets, forms a multitude of small peninsulas and promontories. It is bounded on the north by the gulfs of Lepanto and Patras, on the west by the sea of Cephalonia and Zante, and farther south by the gulf of Arcadia, on the south by the Messenian and Laconian gulfs, and on the east by the gulfs of Nauplia and Ægina, which latter divides Morea from Attica. The greatest length of Morea from the point of Drepanum on the straits of Lepanto, to Cape Matapan, its most southern promontory, is 140 miles, and its greatest breadth, from the coast opposite Zante to the easternmost coast of Argolis, near Poros, is about 125 miles, but the breadth is much less in other parts. Its area has been vaguely estimated at 8800 English square miles (Thiersch, *État actuel de la Grèce*), but it probably exceeds considerably 9000 miles.

The centre of Morea forms an elevated table-land traversed by numerous ridges of hills, which enclose spacious basins, some of them like craters, being so surrounded by mountains, that the water at the bottom, being unable to find a visible outlet, forms marshes and small lakes, some of which have however a subterraneous outlet. [ARCADIA.] The surface of the land has been compared to a number of saucers with snipped borders placed by the side of each other on a table. This is especially the case in the eastern part of the table-land; but on the opposite side the valleys have a long slope to the westward, following the course of the Alpheus and its tributaries, until they merge into the low maritime plains of Elis. Towards the south the long valley of the Eurotas slopes down to the coast between two ranges of mountains, which detach themselves from the central highland, and, projecting into the sea, form the promontories of Malea and Tænarum. Westward of the valley of the Eurotas is the valley of the Pamisus, in Messenia, running likewise from north to south between the ridges of the Taygetus on the east and Mount Ægaleon on the west.

On the north side the table-land of Morea is separated from the maritime district of Achæa by a range of mountains known to the antients by the names of Erymanthus, Lampe, and Cyllene. North-east of these the land slopes down to the level part of the isthmus of Corinth, where the town of that name was built. To the eastward a chain of mountains, detaching itself from the central high land, runs through the peninsula of Argolis, which stretches far into the sea between the Saronic and Argolic gulfs. South of this range is the plain of Argos, watered by the Inachus. Farther south a narrow strip of land extends between the central high land and the sea, along the western coast of the Argolic gulf. The slope of the table-land is much more abrupt on the eastern than on the western side of Morea. For a further description of the surface of the county, see ACHÆA, ARCADIA, ARGOLIS, ELIS, LACONICA, and MESSENIA.

The highest summits of Morea, Taygetus in the south and Cyllene in the north, are reckoned to be somewhat above 5000 feet; snow remains on the highest points of the Taygetus till the month of June. The table-land of Arcadia is often covered with snow in March, while the maritime districts enjoy warm and genial weather. The perennial rivers of Morea are the Alpheus, Eurotas, Pamisus, and Peneus; the other numerous streams along the northern and eastern coasts are dry, or nearly so, in summer, but form rapid torrents in the winter. The atmosphere of Morea is generally pure, the landscape beautiful, and the ground in the valleys and low plains fertile. The mountains afford good pasture, and although the forests have been sadly wasted, still many parts of the mountains are covered with fine pines and oak trees. The country, imperfectly cultivated as it is, produces corn of various kinds, wine, oil, flax, currants and most other fruits; and feeds numerous flocks of sheep. There are no roads, properly speaking, through the peninsula, but only tracks for horses, and some narrow Turkish causeways through the low grounds. The principal towns are—Patras, on the north coast; Gastouni, Arkadia, Navarino, and Modon, on the west coast; Koron and Kalamata, on the south coast; Monembasia, Nauplia, and Argos, besides the islands of Spezzia, Hydra, and Poros, on the east coast; and the towns of Mistra, Tripolitza, Karitena, Kalavrita, and Andritzena, in the interior. For the actual statistics of Morea see GREECE, KINGDOM OF.

The antient history of Peloponnesus forms part of the history of Greece. After the destruction of the Achæan league by the Romans, B.C. 146, the peninsula formed part of the Roman province of Achaia. It remained subject to Rome till the division of the empire. It afterwards belonged to the Eastern or Byzantine emperors till the beginning of the thirteenth century, when the Latins or Franks having conquered Constantinople, the Venetians obtained for their share several islands of Greece and a considerable part of the Peloponnesus, with the towns of Coron, Modon, Argos, Nauplia, Corinth, &c. It was then that they gave the peninsula the name of Morea, from the quantity of mulberries ('more' in Italian) which it produces.

Towards the end of the fifteenth century the Morea was conquered by the Ottomans, and the Venetians were expelled from it. In 1684, war having broken out between Venice and the Porte, the Venetians sent an armament, which conquered the peninsula [MOROSINI], to which they gave the name of a kingdom, subject to Venice, and its flag was hoisted on the square of St. Mark. In 1715 the Turks, after an arduous struggle, reconquered the peninsula. In 1770 an insurrection broke out amongst the Greek inhabitants, at the instigation of Russia, but the Porte marched into it a large body of Albanians, who devastated and reduced the country. In 1820-21 the Moreotes joined in the general revolt of the Greeks, and, after a long struggle, the battle of Navarino (1829) delivered the Morea from the yoke of the Ottomans. The Morea forms now an essential part of the kingdom of Greece.

(Coronelli, *Memorie Storiche e Geografiche del Regno di Morea;* Leake, *Travels in the Morea*, an excellent description of the country; Sir William Gell's *Morea.*)

MOREAU, JEAN VICTOR, a general who rose to celebrity in the wars of the French revolution, was born in 1763, at Morlaix in Brittany, of highly respectable parents, who designed him for the legal profession. But at the age of eighteen years, he had conceived such a passion for military service, that he enlisted as a private soldier; and though his father purchased his discharge, and sent him to study law at Rennes, where he soon made himself conspicuous and popular in defending the privileges of the provincial parliament against the government, he never cordially followed this profession. When therefore the Revolution burst forth, his spirit also broke its fetters; and, accepting the command of a volunteer legion of the Breton youth, he joined at its head the army of the North. From that hour he devoted himself so ardently to the science and practice of arms, that he soon attracted the favourable notice of Pichegru, and rose in two years, by his recommendation, to the rank of general of division. In this capacity, in the campaign of 1794, he signally distinguished himself at the head of a separate corps of 25,000 men, by the rapid reduction of several strong places in Flanders. Moreau himself was politically attached to the Girondists: yet, though the Jacobins brought his unoffending father to the guillotine, he continued to serve under the government of that detestable faction until its overthrow.

After assisting Pichegru in the conquest of Holland, Moreau was appointed commander-in-chief of the army of the Rhine and Moselle, and opened the campaign of 1796 by the defeat of the Austrian general Wurmser, whom he drove across the Rhine, and pursued into Germany. The archduke Charles of Austria, who attempted to arrest his course, met, for some time, with no better success; until the Austrians were so largely reinforced, that Moreau was compelled to yield to numbers, and he then finished this memorable campaign by a masterly retreat through the defiles of the Black Forest, in which, though assailed on all sides by a hostile peasantry, and with a superior army hanging on his rear, he triumphantly fought his way to the Rhine, and covered himself with more glory than by his preceding victories.

At the commencement of the next campaign, Moreau was placed in a most embarrassing situation, by the discovery, through some intercepted despatches, that his old friend Pichegru was in correspondence with the Bourbon princes. He concealed the fact, for four months, until Pichegru had been arrested on other information; when he made a show also of denouncing the plot to the republican government. But he found himself so justly an object of suspicion, that he solicited and obtained leave to retire from the army. His services however were too necessary to be long dispensed with; and he was again actively employed, both in Italy, where he distinguished himself in the cam-

paign of 1799, so disastrous to the French, and also on the Rhine, whither he was recalled to oppose the Austrians.

On Bonaparte's return from Egypt, Moreau proffered and rendered him his services in effecting the revolution of the 18th of Brumaire, and almost immediately afterwards received the command of the armies of the Danube and Rhine; at whose head, at the close of the year 1800, he won from the Austrians the sanguinary and decisive battle of Hohenlinden. The first consul loaded him, on his return to Paris, with eulogy; but Bonaparte and Moreau were each too eager on the same career of ambition, to pursue it without dangerous collision. Bonaparte affected to speak of the victor of Hohenlinden as 'the retreating general;' Moreau retaliated with bitter justice by terming the first consul 'a general at ten thousand men a day.' And when he was invited to become a member of Napoleon's new legion of honour, he openly refused, with the contemptuous sarcasm—'The fool! does he not know that I have been enrolled in the ranks of honour these twelve years!'

But the impatient spirit of Moreau was no match for the ascendant genius and fortune of his rival; and in the beginning of 1804 a charge which pretended to implicate him in the royalist conspiracy of Pichegru and Georges Cadoudal was sufficient to decide his fate. He was condemned, without a shadow of evidence, to an imprisonment for two years, which, by his own request, was commuted into banishment. He retired to America, where he lived tranquilly, with his wife and child, for several years, until, in an evil hour for his fame and his fortunes, he accepted, in 1813, a proposal from the Russian emperor Alexander to assist the allied armies by his counsels against his country. He had scarcely arrayed himself in their ranks when he was mortally wounded at the battle of Dresden, and died in a few days, after bearing the amputation of both legs without a groan.

The admirable retreat through the Black Forest and the brilliant campaign of Hohenlinden must ever be sufficient to place Moreau among the ablest commanders of a period which produced every variety of military talent. He will be remembered however rather as a skilful tactician, at once active and wary, than as a general of very daring and enterprising genius. His mental qualities in other respects partook of the same characteristics; and he wanted the necessary decision to cope with the energy of his great rival, as much as he lacked the skill to conceal his own ambition and envy under the shallow pretext of opposing a republican virtue to the despotic projects of the First Consul. In person Moreau has been described to us as rather under the middle height, and of dark complexion; his manners were simple and unaffected; his morals were pure, and his nature was courageous, humane, and benevolent. The only blot on his honourable career was his junction with the enemies of his country. For this shameful step, to which he was probably seduced by ambition or revenge, excuses have been attempted by those who suppose that he might have identified the cause of the allies with that of French liberty, and who forget that he had never been a royalist; that if he had any political principles, he was professedly a republican; that he could have no dreams of democratic freedom to indulge for his country in the camp of the allied sovereigns; and finally, that he had pledged himself to afford his aid in shedding the blood of his fellow-countrymen and antient companions in arms. 'What singular chance,' said he, to the Swiss general Jomini, in whose company he had formerly fought under the tricoloured flag, and whom he now found in the Russian service, 'has brought you and me together under the banners of the Czar?' 'Singular it doubtless is,' answered Jomini; 'but there is this difference between us—that *I* am not a Frenchman.'

MOREL is an eatable fungus, called by botanists Morchella esculenta. It springs up in orchards, woods, and cinder-walks, early in the spring and summer, and is believed to be most plentiful in places where fires have been made; the country people in Germany are so persuaded of this, that they formerly set fire to woods in order to obtain a crop of morels, of which they are very fond: at last the practice was put down by law. This fungus has a stalk from one to three inches long, and a spherical cap, from the size of a pigeon's egg to that of a swan's, hollow, pale brown or even grey, and deeply pitted all over its surface, the depressions being separated by raised anastomosing lines. The plant has a slight smell and an agreeable taste, and is employed for various purposes of cooking, both fresh and dried. In the former state it is most commonly stewed or stuffed with forcemeat; in the latter it is employed as an ingredient in sauces. In this country it is of rather rare occurrence.

MORE'LES. [MEXICAN STATES.]

MORELL, THOMAS, born at Eton in 1703, studied first at Eton College, then at Cambridge, where he became a fellow of King's College, and in 1743 took his degree of D.D. He was a distinguished classical scholar; he edited several tragedies of Æschylus and Euripides with notes, and made English translations of the 'Prometheus' of the former, and of the 'Hecuba' of the latter. He also edited improved editions of the Greek Lexicon of Hederick, and of Ainsworth's Latin Dictionary. His other works are—1, 'Thesaurus Græcæ Poëseos, sive Lexicon Græco Prosodiacum,' 4to., 1762; republished since, with considerable additions, by Dr. Maltby, Cambridge, 1815; 2, 'Annotations on Locke's Essay on the Human Understanding, 8vo., 1793; 3, 'A Sermon on the Death of Queen Caroline, consort of George II.,' 8vo., 1739, and other Sermons. Dr. Morell died in 1784.

MORE'NA, SIERRA. [SPAIN.]

MORE'RI, LOUIS, born in Provence in 1643, studied at Aix and Lyon, and became doctor of divinity. He conceived the idea of compiling a universal Dictionary, biographical and geographical; for the accomplishment of which he had collected a considerable stock of literary information. He knew also several languages, and was assisted by several friends, who procured him materials for his work, which he published in 1673, in one vol. fol., 'Grand Dictionnaire Historique et Critique de Louis Moreri.' Although its contents are miscellaneous, the biographical part, both in respect of quantity and execution, exceeds the rest. Moreri's Dictionary may be considered as having suggested the idea of subsequent biographical dictionaries. Moreri undertook a new and enlarged edition of his Dictionary, of which he published the first volume, but the second was not entirely printed when the author died in 1680. His constant application hastened his death.

Numerous editions of his Dictionary, considerably altered, revised, and enlarged by several editors, among others by Leclerc and Bayle, have appeared; the last is that of Paris, 1759, in 10 vols. fol. Notwithstanding its many imperfections, Moreri's Dictionary is still a useful work; the genealogical articles are the most complete; the geographical are the most defective. Moreri published also 'Rélations Nouvelles du Levant, ou Traité de la Religion, du Gouvernement, et des Coutumes de Perses, Arméniens, et Gaures, composées par le P. G. D. C. C.' (Père Gabriel du Chinon Capucin).

MORETON HAMPSTEAD. [DEVONSHIRE.]

MORGAGNI, GIOVANNI BATTISTA, was born at Forli in 1682. He studied medicine at Bologna under Albertini and Valsalva, and in 1701 obtained his doctor's degree. He afterwards went to Venice and to Padua, to study chemistry and natural philosophy, and in 1715 he was appointed chief professor of anatomy in the University of Padua. He died in 1771, having been elected a member of all the chief scientific societies in Europe, and having received the highest honours from the contemporary popes and the sovereigns of adjacent nations.

Morgagni's chief works are, 'Adversaria Anatomica prima,' Bononiæ, 1706, a small work in which Haller (*Bibl. Anat.*, ii. 34) says there is scarcely anything which is not new, or at least more clearly described than it had been previously. Five similar collections of miscellaneous observations were afterwards published under similar titles, and in 1719 they were all printed together at Padua—'Epistolæ Anatomicæ'—amounting altogether to twenty, which were published together at Venice in 1762. He edited also the life and works of Valsalva, his former preceptor and friend, whose opinions he constantly and warmly maintained. But Morgagni's most celebrated work was that which he first published in his eightieth year, 'De Sedibus et Causis Morborum per Anatomen Indagatis,' Venice, 1761, in 2 vols. folio, which contains records of an immense number of observations on morbid anatomy, and which conferred nearly as great benefit on pathology as the contemporary works of Haller conferred on physiology. It has been since frequently republished and translated, and is still a standard work of reference.

MORGARTEN. [ZUG.]

MORILLON, one of the names of the *Golden Eye, Clangula vulgaris*. [FULIGULINÆ, vol. xi., p. 8.]

MO'RIO, De Montfort's name for *Cassidaria Echinophora*. [ENTOMOSTOMATA, vol. ix., p. 456.]

MORISCOES is the name given by the Spaniards to the descendants of the Western Arabs or Moors, who, after the taking of Granada (January, 1492) [MOORS], preferred remaining in Spain and embracing Christianity, to leaving the country of their fathers. Hence they were called *Cristianos Moriscos* (Moorish Christians), or *Cristianos nuevos* (new Christians), to distinguish them from the rest of the Spanish population, who styled themselves *Cristianos viejos* (old Christians). The adjective *Moriscos* is derived from *Moros*, and has a meaning expressive of contempt.

The terms granted to the city of Granada on its surrender were rather favourable. The inhabitants were to preserve, besides the peaceable and undisputed possession of their property, the use of their religion and laws, the latter to be administered by their own elective magistrates, and the former to remain under the direction of their native priests and theologians. They were to retain also their customs, manners, language, and national dress, and by two express articles of the capitulation no Moslem was ever to be compelled to embrace Christianity, and no attempts were to be made on the part of the Spanish sovereigns to induce the people to forsake the Mohammedan religion. The capitulation was also extended to all the Moors of Aragon and Castile, who had lived for centuries under the sway of the Spanish kings, and Ferdinand and Isabella pledged their royal word, not only in their own name, but in that of their successors, never to violate the capitulation.

A treaty containing two such articles was soon deemed incompatible with the interests of the Christian religion, and scarcely had two years passed when it was openly infringed by Ferdinand. Fray Hernando de Talavera, a monk, was appointed archbishop of Granada (1492), and received instructions not to spare any means for bringing the followers of Mohammed to the Christian faith, and the famous Ximenez de Cisneros was named to assist him in the undertaking. At first the two prelates began their task with comparative moderation; they preached the Christian doctrine, they published and circulated religious tracts, and used every means of persuasion to convert the Mohammedans. But these proving ineffectual, they had recourse to the device of claiming as members of the Christian community all those Mohammedans whose ancestors could in any manner be traced to have been Christians; and as their number was very considerable, thousands were seized and subjected to a compulsory baptism (1499). The Moors, seeing their capitulation violated, flew to arms in the Albaycin and other places of the kingdom of Granada (1500), but they were everywhere overpowered, and their rebellion becoming the pretext of a new and more decided persecution, orders were issued throughout the kingdom that all the Moors should leave the country in a given time or receive baptism. The majority readily submitted to these terms, hoping to be freed in future from violence and persecution. The order was further extended to the Moriscoes of Aragon, a province in which, owing to the mildness of the law and the more liberal tendency of the institutions, the Moriscoes had enjoyed comparative freedom, and the sentence was carried into execution, but not without resistance, especially in Valencia.

Once made Christians, at least in appearance, the descendants of the Arabs had to encounter a new and more formidable enemy. The Inquisition, instituted in 1232, under the pontificate of Gregory IX., had hitherto been confined to Ferdinand's dominions in Aragon. The simulated conversion and frequent relapse of the Moors of Andalusia were pleaded as an excuse for its establishment in Castile. The tribunal was invested with new and unusual powers, and its jurisdiction extended to the rest of the monarchy, so as scarcely to leave a corner of the Peninsula free from fire and faggot.

To detail the horrors, the persecutions, to which that execrable tribunal subjected its victims, would take us far from our object. The reader may consult Llorente's *History of the Spanish Inquisition*, and Dr. Puigblanc's *Inquisition Unmasked*, in both which works he will find ample information on this subject. According to the former writer the number of victims who in the first thirty-seven years experienced the rigour of that tribunal amounted to 204,413, of whom 13,000 were publicly burned.

During the reign of Charles V. the Moriscoes enjoyed comparative tranquillity. The attention of that monarch was too much absorbed by the foreign wars in which Spain was at the time engaged, to give him leisure to meditate reforms of internal policy. But under Philip II., his son and successor, the forced converts had again to encounter a most violent persecution. It was suggested that as long as the Moriscoes preserved their manners, dress, and language, different from the Spaniards, their conversion could not be deemed sincere. Accordingly by the *pragmatica* (royal decree), dated September, 1556, it was declared that the new Christians should in three years learn the Spanish language and entirely forsake their native tongue; that all books written in Arabic should be seized and burnt; that instead of their national costume they should adopt the Spanish dress; that all their baths should be pulled down; that their wives should walk the streets unveiled; and that the men themselves should forsake their Arabic names and surnames, and call themselves after some saint of the Roman calendar, in the Christian fashion.

This outrageous injustice and violation of everything which is dear to man again drove the Moriscoes to despair and resistance. They rose in the Alpuxarras and proclaimed Fernando de Valor, a descendant of the royal family of Umeyyah; and the rebellion, which lasted three years, was only put down by the talents and abilities of John of Austria (1570). As a punishment for their revolt, the baptized infidels were transported from Andalucia and dispersed among the Christian inhabitants of the interior of Spain. They were more closely watched; they were subjected to all sorts of humiliation and indignities, and when it was perceived that neither force nor persuasion was sufficient to make them sincere converts, their general expulsion from the kingdom was decreed. In 1610, under Philip III., and during the administration of his favourite the duke of Lerma, the Moriscoes, to the number of about eight hundred thousand, others say one million (not to mention such as, by assuming the disguise of Christians, spread over Catalonia and Southern France), were put on board the royal galleys prepared for them, and landed on the coast of Africa, without being allowed to take with them any property except what they could carry about their persons. The loss which Spain sustained by this rash measure must have been immense, since the ruin of her agriculture and trade may be partly attributed to the banishment of so large a part of the industrious population.

Literature.—It cannot be supposed that the descendants of a people who had been the passionate lovers of science should be entirely devoid of a literature of their own. There is every reason to suppose that books on all subjects were written and circulated among them; and the discovery lately made (see an article in the *British and Foreign Review*, No. XV.) in the libraries of Spain of several works written in Spanish, but with the Arabic character, all belonging to the Moriscoes, proves to what extent literature was cultivated even among that persecuted and degraded race.

We are told that the libraries of the Escurial and Madrid contain upwards of a hundred of these manuscripts, which are also said to exist in other public libraries of Europe confounded with the Arabic manuscripts, owing to the circumstance of their being written in the same characters. Their contents are poems, chiefly on sacred history; descriptions in prose of Cordova, Granada, Seville, and other cities of Spain, such as they were under the sway of the Mohammedans; books on religion and law; translations of the Korân into Spanish; collections of recipes for the cure of all diseases, secrets of husbandry, complaints against the Inquisition and the clergy, and itineraries showing the road to be taken, and the disguise and stratagems to be employed in order to leave Spain and take refuge in the countries where the Mohammedan religion was prevalent.

The language in which these books are written is a peculiar dialect or mixture of Spanish and Arabic, varying according to the age of the writers, and the parts of Spain where they were composed. Some of the earliest specimens (fourteenth century) are almost pure Arabic words with Spanish terminations and Spanish constructions.

Many reasons influenced the Moriscoes thus to write a foreign language, using their own characters: first, and principally, that sort of superstitious reverence which all Eastern people have for their letters, it being well known that Syrian Christians use their own characters to write

Arabic, and that the Jews of our days write Portuguese and German with their own letters; 2ndly, the respect in which Arabic characters are held by all Mohammedans, owing to the Korân being written in them; and 3rdly, the wish to conceal from the eyes of monks and inquisitors their prayers and tracts concerning the Mohammedan religion, in which they persevered notwithstanding their outward show of Christianity. It is likely also that books were written in this dialect for fear that Arabic would not be understood by the people for whom they were designed; since it is well known that, owing to their long stay among the Christians, and to orders prohibiting them from conversing in Arabic, the Moriscoes at first corrupted their language, and finished by entirely forgetting their native tongue, for which they substituted a mixture of Spanish and Arabic called *aljamia*, which in aftertime became so similar to the Spanish, as to be easily understood by any person unacquainted with Arabic.

(Bleda, *De la Justa Expulsion de los Moriscos*, Valencia, 1618; Marmol Carvajal, *Rebelion y Castigo de los Moriscos del Reyno de Granada*, fol., Malaga, 1610; Guadalajara, *Expulsion de los Moriscos de España*, 8vo., Pamplona, 1614; *Notices et Extraits des MSS. de la Bibliothèque du Roi*, vol. iv., Paris; *British and Foreign Review*, No. XV.)

MORLAIX, a town in France, in the department of Finistère, situated at the junction of the little rivers Relec or Ossen, and Jaclo or Jarlo, on the road from Paris to Brest, 328 miles from Paris and 34 from Brest.

Morlaix (in Breton, Montroules) is of antient but unknown origin. At an early period it was an object of contest between the dukes of Bretagne and the viscounts of Léon, and was subsequently taken and retaken by the English and French in the civil contests of Bretagne in the fourteenth century. It suffered in the religious wars of the sixteenth century, and submitted to Henri IV., A.D. 1594.

The town is agreeably situated on the side of two hills, and is cleaner than the generality of the Breton towns. It has some wide and good streets. The united stream of the Ossen and Jaclo is called the Morlaix river, and is navigable up to the town. It is a tide river, with a rise of 12 feet at high-water. Vessels of 400 tons can come up to the quays, which are faced with granite. The houses on the quays are well built, and have a colonnade, which serves for an Exchange. The river, above the quays, passes through a covered channel under the town-hall (a large building of the age of Louis XIII.) and the grand place or great square. There is a castle to guard the entrance of the river; and at the mouth of the river is a safe roadstead. The church of St. Martin is in modern style; that of St. Mathieu is remarkable for its steeple. There are baths and a theatre.

The population of Morlaix in 1831 was 7797 for the town, or 9596 for the whole commune: in 1836 it was 9740 for the commune. The townsmen manufacture linens, woollen cloth, hats, paper, and glue; there are tan-yards and sugar-houses, and an extensive government snuff manufactory. Considerable trade is carried on in linens of every kind, butter, tallow, hides (raw and dressed), honey, wax, paper, flax, hemp, corn, seed, and cattle. It is the chief trading port of the department. There are twelve yearly fairs, one of which lasts eight days. There are several judicial and fiscal government offices, and a free-school for navigation. General Moreau was a native of Morlaix.

The arrondissement has an area of 508 square miles, and comprehends fifty-eight communes; it is divided into ten cantons or districts, each under a justice of the peace. The population in 1831 was 131,680; in 1836 it was 136,535.

MORLAND, SIR SAMUEL. Samuel Morland was the son of the Rev. Thomas Morland, of Sulhamstead-Bannister, near Reading in Berkshire, and born somewhere about the year 1625. He received his education at Winchester school and Cambridge. He remained at Cambridge for ten years, but never took a degree. Soon after his departure from college, we find him sent on the famous embassy to to the queen of Sweden in company with Whitelocke and a retinue of other gentlemen. Whitelocke, in his Journal, calls him 'a very civil man, and an excellent scholar.' On his return, Morland became assistant to Thurloe, the secretary of Oliver Cromwell. He also took a prominent part in the attempt to relieve the sufferings of the poor people of Piedmont, being appointed 'commissioner extraordinary for the distribution of the collected moneys' by the Protector, who also made him one of the clerks of the signet, in March, 1665.

Morland is said to have been privy to the plot usually known as Sir Richard Willis's plot, and, as it is so intimately connected with Morland's history, we give an abstract of the narrative as arranged by Birch in his 'Life of Thurloe,' although we think that it is far from being altogether supported by proper evidence.

In the beginning of the year 1659, Thurloe, Cromwell, and Sir Richard Willis formed a design of ruining King Charles at one blow, by sending over messengers with plausible letters 'to invite him to come over in a single ship, with only his two brothers and a few more, to a certain port in Sussex, upon an appointed day, where they were promised to be received and supported by 500 foot at their first landing, and 2000 horse within one day after.' This plot was discussed in Thurloe's office, when Morland was at his desk apparently asleep: Welwood says that Cromwell, when he saw him, drew his sword, and was only dissuaded from despatching him on the spot by the earnest solicitation of Thurloe, who assured him that Morland had sat up two nights together, and was certainly fast asleep. Disgusted at this proceeding, Morland immediately determined to divulge the plot to the king, which he did by means of one Major Henshaw, who was then imprisoned in the Tower. The king, being thus cautioned, answered, that 'he could not be ready so soon as the appointed day,' which gave the three projectors some apprehension and suspicion of the discovery. Not being satisfied however with this answer, Willis was appointed to contrive other letters, urging his majesty 'to use expedition, and not lose so fair an opportunity for his happy restoration.' The king answered, that he was not very well, or something that appeared so frivolous, that they justly concluded their whole project was discovered, and Willis was suspected of having divulged it. Under these circumstances Willis sent for Morland, who went, not considering it safe to decline the meeting, but took two pistols with him. At the appointed place, he was met by another person, by whom he was conducted with the utmost caution into a dark deep cellar, where, by the light of a candle, he saw Sir Richard by himself with a Bible before him. Sir Richard told him plainly that 'he had sent for him on account of the discovery of a secret of the highest importance, which could not possibly be known to more than three persons beside himself.' Then, recounting the particulars, he laid his hand upon the Bible, and solemnly swore that he had not been the discoverer, and requested him to do the same. Morland told him, 'he was ready to do so, if he would give him a reason why he should suspect him.' All this he did with such a remarkable presence of mind, that Willis was completely damped, and Morland escaped from further interrogation. In May, 1660, he went to the king at Breda, in Holland, who received him kindly, made him a knight, and soon afterwards a baronet.

Echard, in his 'History of England,' produces a letter from Sir Samuel to Willis, dated March 10, 1660, in which he expressly denies the whole of the above statement; but Morland's own testimony in his autobiography is to the contrary: if he did write it at all, it was probably intended merely as a means of safety from the wrath of Sir Richard Willis.

On the restoration of Charles he was made master of mechanics to his majesty, who also presented him with a medal as an 'honourable badge of his signal loyalty.' He was soon afterwards made a gentleman of his majesty's privy-chamber.

In 1677 he took a lease of a house at Vauxhall, for twenty-one years, from the heirs of Jane Vaux, the daughter of Guy Vaux, of gunpowder celebrity. This house was situated where Vauxhall Gardens now are. Two years afterwards, he had a pension of 400*l.* settled upon him, but embarrassments in his affairs, owing to an imprudent marriage, obliged him to dispose of it. He afterwards removed to a house at Hammersmith, near the water-side, where he died, December 30, 1695, and was buried in Hammersmith chapel on January 6 of the following year. The three last years of his life were spent very wretchedly. Poverty and loss of sight compelled him to rely almost solely on the charity of archbishop Tenison. In a letter dated March 5, 1694, he returns him thanks for his kindness, 'which was far greater,' says Sir Samuel, 'than such a poor wretch as

I could ever hope for.' This letter, written when he was blind, is a very curious relic, and is now preserved in the library at Lambeth Palace. John Evelyn, in his Diary, gives an interesting description of him when suffering under this accumulated load of misfortunes:—'25th Oct., 1695. The archbishop and myself went to Hammersmith to visit Sir Samuel Morland, who was entirely blind, a very mortifying sight. He showed us his invention of writing, which was very ingenious, also his wooden calendar, which instructed him all by feeling, and other pretty and useful inventions of mills, pumps, &c., and the pump he had erected, that serves water to his garden, and to passengers, with an inscription, and brings from a filthy part of the Thames, near it, a most perfect and pure water. He had newly buried 200*l.* worth of music-books, being, as he said, love songs and vanity. He plays himself psalms and religious hymns on the theorbo.' The inscription which Evelyn refers to was on a stone-tablet fixed in the wall, and is still preserved; the following is a copy of it: 'Sir Samuel Morland's well, the use of which he freely gives to all persons: hoping that none who shall come after him will adventure to incur God's displeasure by denying a cup of cold water (provided at another's cost and not their own) to either neighbour, stranger, passenger, or poor thirsty beggar. July 8, 1695.'

Sir Samuel married three times; he was divorced from his last wife in 1688. The monuments of his two first wives are in Westminster Abbey.

It now remains briefly to notice his writings and mechanical inventions. From some correspondence between Morland and Dr. John Pell, preserved in Birch's collection of manuscripts in the British Museum, it appears that Sir Samuel, as early as 1666, had intended to publish a work on the quadrature of curvilinear spaces, and had actually proceeded to print a portion of it, when, by the advice of the latter, he was persuaded to lay it aside altogether. In the rough draft of a letter to Morland, dated April 7, 1666, in giving his opinion on the portion of the work already printed, Pell says, 'The love which I bear to truth and to the author of those papers does constrain me to desire that they may rest awhile unpublished.' Morland not only yielded implicitly to his directions, but, in a letter written shortly afterwards, he furnishes arguments against some propositions in his own treatise: 'I should desire,' says he to Pell, 'to bee altogether mute, and to submitt to your judgement in all things.' Pell, in another place, informs us that two sheets of the work were actually printed.

It was about this period that he invented his arithmetical machine, which he makes mention of in a letter dated May 13, 1666. He did not however publish an account of it before the year 1673, when, 'by the importunity of his very good friends,' it was made public. The little work in which it is described is illustrated with twelve plates, in which the different parts of the machine are exhibited. Its operations are conducted by means of dial-plates and small indices, moveable with a steel pin. By these means the four fundamental rules of arithmetic are very readily worked, and, to use the author's own words, 'without charging the memory, disturbing the mind, or exposing the operations to any uncertainty.' His 'Perpetual Almanac' is given at the end, which was often printed separately. One copy of Morland's little book, now in the possession of Professor Davies of Woolwich, contains a very beautiful portrait of the author, but, with this exception, we have never seen an exemplar so distinguished.

We are indebted to Morland for the speaking-trumpet in its present form, an account of which useful instrument he published at London in 1671, under the title of 'A Description of the Tuba Stentorophonica, an instrument of excellent use as well by sea as by land.' In this rare tract, consisting of eight leaves, he gives an account of the various experiments that he made before his instrument attained a certain degree of perfection. The first trumpet that he constructed, 'although,' says Sir Samuel, 'the invention had been long before digested in my thoughts,' was made in glass in the year 1670, being about 2 feet 8 inches in length, the diameter of the greater end 11 inches, and that of the other end 2½ inches: 'with this,' he says, 'I was heard speaking at a considerable distance by several persons, and found that it did very considerably multiply the voice.' After giving a description of some experiments with other trumpets, he enters into a philosophic disquisition on the nature of sound, and the best form of the speaking-trumpet, which he leaves doubtful, and concludes with 'an account of the manifold uses' of his instrument, which are very excusably exaggerated: he appears also to have overrated the power of his trumpet; for, in his 'Urim of Conscience,' he says that he has no doubt but that it might be improved so as to carry the voice for the distance of ten miles. A French translation of Morland's treatise was published at London in 1671; and, in an advertisement prefixed, it is stated that Morland's tubes were sold by Moses Pitt, a bookseller in St. Paul's Churchyard, at the price of 2*l.* 5*s.* The invention excited much general interest at the time so Butler makes Hudibras say,

> 'I heard a formidable voice,
> Loud as the Stentophonic noise.'

There is one of Morland's original trumpets, now preserved in Trinity College Library, Cambridge, about six feet long: it is in bad condition, and no one knew what it was till very lately, when it was identified by a member of the college.

All former biographers have asserted that he invented the fire-engine, but he ought to be considered rather an improver than an inventor of that machine. As early as 1590, Cyprian Lucar, in his treatise named 'Lucar-Solace,' gave a description of a rude fire-engine, which he designated by the name of a squirt, and which acted precisely on the principle of that instrument. Evelyn also mentions a fire-engine invented by Greatorix in 1656, which was ten years before he saw the 'quench-fires' of Sir Samuel.

The principal objects of Sir Samuel's study were water-engines, pumps, &c., which he carried to a high degree of perfection: his pumps brought water from Blackmore Park, near Winkfield, to the top of Windsor Castle. A bill to enable him 'to enjoy the sole benefit of certain pumps and water-engines by him invented,' was read the first and second times in the House of Commons on the 12th and 13th of February, 1674, but it did not pass; he obtained however a patent for them in the course of the following year. In 1697, two years after his death, a tract by him was published at the expense of his son. It is entitled 'Hydrostatics, or Instructions concerning Waterworks,' and contains an account of his various methods of raising water, besides tables of square and cube roots: from the close of Joseph Morland's preface, it appears that many of his father's works were left unpublished. There is also a treatise by Sir Samuel, in the Harleian collection of manuscripts, which is entitled 'Elevation des Eaux, par toute sorte de Machines, reduite à la mesure, au poids, et à la balance: Presentée à sa majeste tres Chrétienne,' 1683: at page 25 commences a very short tract on the steam-engine, entitled 'The Principles of the New Force of Fire invented by Chev. Morland in 1682, and presented to his most Christian Majesty, 1683,' and these principles are explained as follows:—

'Water being converted into vapour by the force of fire, these vapours shortly require a larger space (about 2000 times) than the water before occupied, and, rather than be constantly confined, would split a cannon. But being duly regulated according to the rules of statics, and by science reduced to measure, weight, and balance, then they bear their load peacefully (like good horses), and thus become of great use to mankind, particularly for raising water, according to the following table, which shows the number of pounds that may be raised 1800 times per hour to a height of six inches by cylinders half filled with water, as well as the different diameters and depths of the said cylinders:' then follows his table of the effects of different sized cylinders. This evidently indicates a perfect knowledge of the subject, and, to his great credit also, let it not be forgotten that he has correctly stated the increase of volume which water occupies in a state of vapour, which must have been the result of experiment: his researches however seem to have had little influence on the progress of the practical application of steam.

In 1658 he published his 'History of the Evangelical Churches of Piedmont,' which was drawn up at the request of Archbishop Usher, but it is not a very creditable performance. According to Beughem, in his 'Bibliographia Mathematica,' he wrote 'articles and rules for the better government of his majesty's forces by land during this present war.' His 'Doctrine of Interest, both Simple and Compound,' published in 1679, is a very praiseworthy little volume, and the tables are very accurately calculated; but his 'New Rule for the Equation of Payments' is

erroneous. Another tract by him, consisting of four leaves, and entitled 'The Count of Pagan's Method of Delineating all manner of Fortifications (Regular and Irregular) from the exterior Poligone reduced to English Measure and converted into Hercotectonic Lines,' was published in 1672, in Venn's 'Military and Martial Discipline.' The 'Urim of Conscience' was written during his blindness, and is a very singular piece of composition: it contains reflections on the fallen state and insignificance of man, and the uncertainty of life. By one of his letters to Archbishop Tenison, dated 28th of July, 1688, and preserved in the archiepiscopal library at Lambeth, it appears that he once had an intention of publishing the first six books of Euclid for the use of public schools.

Morland is said to have written a treatise on the barometer, which was answered by Lord North in another tract on the same subject. He is also said to have invented the capstan to heave up anchors, but he must be considered rather an improver than the inventor of that machine: the same remark will apply to various other performances, which have elsewhere been attributed to him.

In the library at Lambeth Palace is an autobiography of Sir Samuel Morland, written by him in the latter part of his life, together with several other letters and papers: it is from this original source that we have here given several particulars never before published. We have also made use of the biography of Sir Samuel in Chalmers's 'Biographical Dictionary,' which is a good piece of biography, considering that he had no foundation to rest on; as also of a separate account of his life, writings, and inventions, by J. O. Halliwell, Esq., which was published at Cambridge a short time ago.

MORLAND, GEORGE, was the son of Henry Robert Morland, an indifferent painter, from whom he received his first instructions, but very soon surpassed his master. He first painted landscapes and one or two small conversation pieces: his favourite subjects however were domestic animals, horses, dogs, pigs, &c., which he painted in a masterly manner. In the exhibition of the Royal Academy in 1791 he had a picture representing the interior of a stable, with horses, draymen, &c., larger than a half-length: it is an excellent performance, and may perhaps be considered as his masterpiece. Morland was a perfect master of the mechanism of the art. With a correct eye for effect, he observed and executed with equal rapidity; and though without imagination, rendered his subjects interesting by faithful expression of their essential character and picturesque arrangement. Edwards regrets that 'his low and vulgar propensities led him into society ill calculated to improve his mind or manners.' But Fuseli says, 'It is surely one of the favourite paradoxes of the age to wonder at the association of a man's favourite objects of amusement with his favourite objects of study. It would be a disgusting idea, if it were a possible one, that the man who, with congenial satisfaction, spends the day in pencilling, to a degree of deception, a sow amid her litter, could long for the recreation of elegant society in the evening.' Morland was born in 1764, and died in 1804, at the early age of 40.

MORLEY, THOMAS, one of the most distinguished of our early composers, and author of the first regular treatise on the art of music that appeared in the English language, was born probably about the middle of the sixteenth century, but the exact time is unknown; indeed, our information concerning him is remarkably scanty, the celebrity of his works being considered. All that is known of this eminent professor is gathered from Wood, who, in his *Athenæ Oxonienses*, tells us that he was a disciple of Birde, to whom he dedicated his book in very reverential and affectionate terms; that he obtained a bachelor's degree in 1588, and was sworn into his place as gentleman of the royal chapel in 1592. He died, Dr. Burney supposes, in or near the year 1604.

Morley produced many compositions that are still well known, among which are, canzonets of different kinds, particularly for two voices, madrigals for five voices, and services and anthems, including the fine *Funeral Service* published in Dr. Boyce's collection, the first that was set to the words of our reformed Liturgy. He also published *Consort Lessons, made by divers exquisite authors, for six different instruments to play together, viz., the Treble Lute, Pandora, Citterne, Base-Viol, Flute, and Treble-Viol*, 2nd edition, 1611. He likewise collected and edited that collection so familiar to madrigalists, *The Triumphs of Oriana*, 1601. In Queen Elizabeth's *Virginal Book* are five sets of lessons by Morley. But the work on which his fame is chiefly built is that alluded to above, *A Plaine and Easie Introduction to Practical Musicke*, fol., 1597, which continued in use above a century and a half, and is still read and esteemed by most well educated musicians; for though it contains much that is become obsolete, and the language has all the quaintness, amounting often to obscurity, of the period at which he wrote, yet it exhibits a full knowledge of the subject, great acumen, a bold spirit, and much curious learning. It was translated into the German language by John Caspar Trost, a profound musician of the 17th century; and the scientific Florentine patrician, Doni, mentions the author as *il erudito musico Inglese*.

Morley obtained of Queen Elizabeth an exclusive patent for the printing of music, under which William Barley published most of the music books that appeared during its continuance. This was granted in 1598, in lieu most probably of some bounty which ought to have been forthcoming from the privy-purse of the discerning but parsimonious queen.

Hawkins and Burney, it has been truly remarked, have in their histories failed to do justice to the compositions of Morley; indeed each of these writers is at variance with himself in criticising the productions of one of the earliest and greatest of our musicians. Neither has selected as specimens of his works the most original and agreeable of them, a fact only to be accounted for by supposing that Hawkins had a taste for what is now thought uncouth, and that Burney's prejudice against the early English masters occasionally blinded his judgment.

MORMON, Illiger's name for a genus of *Alcadæ*, *Fratercula* of Brisson. [Auk, vol. iii., pp. 100, 101.]

MORMOPS, Dr. Leach's name for a genus of *Vespertilionidæ*. [Cheiroptera, vol. vii., p. 24.]

MORNINGTON, GARRET, EARL OF, whose claim to be numbered and ranked high among the composers of the British Isles is freely acknowledged, was born in the county of Meath in or about the year 1720, and advanced from the dignity of an Irish baron, which he inherited, to that of an earl, in 1760. Devoting much of his time to his favourite art, his life seems to have been quite domestic and devoid of those incidents which contribute so largely to the page of biography; but success of a very decided kind attended his chief pursuit, and 'small indeed,' it has truly been said, 'is the number of professors who, by their works, have arrived at the same rank in the art as that so fairly gained and so incontestably possessed by the noble earl.'

All that we know of the early history of this distinguished nobleman is from a paper printed among the *Miscellanies* of the Honourable Daines Barrington, whence we derive the following curious particulars. The earl's father played tolerably well on the violin, and by his performance delighted the babe while yet in the nurse's arms. But even at that infantine period he seemed to be capable of distinguishing the difference between tolerable and excellent; for Dubourg, a celebrated violinist, being on a visit at the family seat, 'the child would not permit him to take the violin from his father, till his little hands were held;' but having heard the professor, he did his utmost to prevent the return of the instrument to his father. Nearly at the same age he could beat time to every piece of music, and the most sudden changes in the measure were immediately perceived and followed by him. From sheer indolence he never attempted to perform on any instrument till his ninth year: he then took up the violin, and soon was able to play the second part in Corelli's sonatas. Shortly after he attempted composition, and achieved a minuet, which however evinced more enterprise than genius. At fourteen he discarded the violin for the harpsichord. About that time his father ordered an organ for his chapel, telling his son that he should at once have been appointed organist, had he been qualified. The instrument was finished in eighteen months, when it was found that the young dilettante had fully prepared himself for the situation which his noble parent had jocosely wished he could fill. Unrelaxing in his musical studies and labours, Lord Mornington so distinguished himself, that the University of Dublin conferred on him the degree of Doctor in Music, and subsequently elected him professor of that faculty. He died in 1781, and was succeeded by Richard, the present marquis of Wellesley.

Lord Mornington's compositions are chiefly vocal: some

are for the church, and are to be found in the choir-books of St. Patrick's Cathedral. But he excelled most in what is undeniably our own national music, the glee. His four-voiced glee, 'Here in cool grot,' which gained the gold prize-medal given by the Catch Club in 1779, is a work of first-rate genius—is a masterpiece. 'Gently hear me, charming maid!' another of the same kind, published in Warren's 25th collection, is, it has been truly said, 'overflowing with taste and feeling.' 'Come, fairest nymph,' likewise for four voices, has always been, and most likely will continue to be, admired for its brilliancy and skill; and 'O, bird of eve,' a glee for five voices, is, though short, one of the most elegant effusions that vocal harmony can boast.

'But,' it is remarked by a writer in the *Harmonicon*, 'honourable to Lord Mornington, considered as a man of genius, as were the praises bestowed on what we venture to call the offspring of his muse—praises wherein the succeeding age joined, and which the present has repeated—the glory that encircles his name derives its highest lustre from the acts of his own immediate progeny: one of the most accomplished statesmen of the period in which we live, and the greatest general that this or any age ever produced, owe to him their existence.' And it may fairly be presumed, we will add, that probably to the forming of their minds, to his care of their education, they are indebted for that correctness of judgment and energy of action which have so much distinguished both.

MOROCCO. [MAROCCO.]

MOROSI'NI, an illustrious family of Venice, which had several doges and other distinguished individuals among its members. Paul Morosini, born in 1406, wrote an 'Apology' for the Venetian government, and other works. Andrea Morosini, who died in 1618, wrote a continuation of Paruta's 'History of Venice,' down to the year 1615. But the most illustrious of the family is Francesco Morosini, who was born in 1618, served in the navy of the republic against the Turks, and was appointed commander of the fleet in 1651, and general-in-chief for the defence of Candia against the Turks. He made a most gallant resistance against very superior forces, and at last concluded an honourable capitulation with the grand-vizier Coprogli in 1669. [CANDIA.] On his return to Venice, his conduct, having been made the subject of an inquiry, was fully justified.

In 1684, war having broken out again between Venice and the Porte, Morosini was appointed captain-general of all the forces of the republic. After sailing to Corfu, he attacked and took the island of Santa Maura, and also the town of Prevesa on the coast of Epirus. In the following year he landed in the Morea with 10,000 men, took Coron by storm, and, being joined by the Mainotes, took Calamata, and defeated a Turkish army which was sent against him. In the year after he took Navarino and Modon, defeated the seraskier, and gained possession of Napoli after an obstinate defence. In 1687 he again defeated the seraskier in a pitched battle near Patras, and seized his standard. This victory was followed by the reduction of Patras, Lepanto, Corinth, and the whole of the Morea. Morosini then landed at the Piræus and attacked the Acropolis of Athens. It was in this siege that a shell, thrown by the Venetians, fell on the Parthenon, where the Turks had deposited their powder, and partly destroyed it. The Turkish garrison then surrendered.

In 1688 Morosini landed on the island of Eubœa, but was obliged to re-embark his troops, owing to the malaria fever having broken out in his camp. That same year the doge Giustiniani died, and Morosini, though absent, was elected in his place, retaining his command in the Levant, a thing unusual in the suspicious aristocracy of Venice. In 1689 Morosini returned to Venice; the senate in a body went to meet him at sea, and escorted him in triumph to the landing-place at the square of St. Mark, amidst the acclamations of the whole population. This was a proud day for Venice, the last day of triumph in her history of a thousand years. A few years after, Morosini, then old and infirm, was sent again to the Morea, when illness terminated his glorious career, at Nauplia, in 1693. A statue of bronze was erected to him in the hall of the Council of Ten. In imitation of the great captains of antiquity, the adjunct 'Peloponnesiacus' was added to his name. His tomb is in the church of S. Stefano at Venice, with the inscription, 'Francisci Mauroceni Peloponnesiaci Venetiarum Principis Ossa.'

MOROXYLIC ACID, or MORIC ACID, was discovered by Klaproth, combined with lime, on the bark of the *Morus Alba*, or white mulberry. It is obtained by decomposing the natural moroxylate of lime by acetate of lead; and then decomposing this salt by sulphuric acid; sulphate of lead being precipitated, the moroxylic acid remains in solution. Some doubts are however entertained whether it is a peculiar acid.

MO'RPHIA, the first discovered of a numerous and important class of vegetable products, or alkalis, sometimes termed alkaloids. It was obtained in 1803 by Sertuerner, a German chemist, from opium, in which it exists in combination with a peculiar vegetable acid, the meconic acid, and probably also with sulphuric acid.

Various processes have been proposed for obtaining morphia: the 'London Pharmacopœia' directs a solution of opium to be decomposed by chloride of lead, by which meconate of lead and a little sulphate are precipitated, and hydrochlorate of morphia remains in solution: by evaporation it is obtained in crystals, which are to be decoloured by treatment with animal charcoal; when again crystallized, and decomposed by ammonia, the precipitate obtained, which is morphia, is to be again converted into hydrochlorate by dissolving it in hydrochloric acid; and this, when again decomposed by ammonia, yields morphia in a state of considerable purity

Another process consists in adding ammonia to a concentrated aqueous solution of opium, by which meconate of ammonia is formed, and remains in solution; while the morphia, mixed with narcotina, is precipitated: these are separated by digestion in proof spirit at a temperature of about 120° or 130°, which dissolves most of the narcotina and colouring matter: the morphia is then dissolved in boiling alcohol, from which it crystallizes as the spirit cools.

Another method, proposed by Drs. Gregory and Robertson, is that of decomposing the aqueous solution of opium by means of chloride of calcium. Meconate of lime is thus precipitated, and hydrochlorate of morphia left in solution; this, by treatment with animal charcoal and repeated crystallization, is rendered pure, and morphia may be obtained from it by ammonia.

The properties of morphia are, that it is precipitated in a flocculent state, which, on standing and stirring, assumes a crystalline appearance: it is colourless, and its taste is bitter. According to Berzelius, it is insoluble in cold water; and boiling water dissolves rather more than 1-100th of its weight, the solution on cooling yielding crystals; the hot solution possesses the alkaline property of turning turmeric paper brown. Morphia is soluble in 40 parts of cold anhydrous alcohol, and in 30 parts when it is boiling; it is dissolved also by the volatile and fixed oils, but in æther it is nearly insoluble. Solution of potash and soda take it up in considerable quantity, but ammonia in small proportion. When heated strongly, it emits a resinous smell, smokes, and burns with a lively red flame, and leaves charcoal.

The alcoholic solution yields crystals by spontaneous evaporation; they have a pearly lustre, and their primary form is a right rhombic prism.

Morphia has been several times subjected to analysis; the results are not very different from each other: it its anhydrous state it appears to consist of—

Eighteen equivalents of hydrogen .	18 or	6·33
Thirty-four equivalents of carbon .	204	71·83
Six equivalents of oxygen . . .	48	16·90
One equivalent of azote . . .	14	4·94
Equivalent . .	284	100·

The crystals contain two equivalents of water, or consist of—

One equivalent of morphia . .	284 or	94·04
Two equivalents of water . . .	18	5·96
Equivalent . .	302	100·

Morphia is probably the most active principle of opium, but being so very slightly soluble in water, it is never used alone medicinally; having however, like other alkalis, affinity for acids, it readily combines with them and forms salts, which are now extensively used in medicine.

The acetate and hydrochlorate of morphia are those salts which are usually employed medicinally; the hydrochlorate, as has been just stated, is prepared by dissolving the alkal.

in dilute hydrochloric acid, and, after evaporation, allowing the salt to crystallize.

Hydrochlorate of morphia, frequently called muriate of morphia, is a colourless, inodorous, bitter salt, which crystallizes in plumose acicular crystals: it is soluble in 16 to 20 times its weight of water; and when boiling water is saturated with it, a crystalline mass is formed as it cools; it is also dissolved by alcohol. When exposed to a red heat, it is totally decomposed and dissipated. It consists of—

One equivalent of hydrochloric acid	37	or	11·52
One equivalent of morphia . .	284		88·48
Equivalent .	321		100·

In the state of crystals it contains water, and appears to consist of

One equiv. of hydrochlorate of morphia	321	or	85·6
Six equivalents of water . .	54		14·4
Equivalent .	375		100·

Acetate of morphia is prepared by dissolving the alkali in the acid, and evaporating the solution so that crystals may form; these are not however very readily procured, and by the evaporation of the solution a part of the acid is sometimes dissipated, and a portion of the acetate, suffering partial decomposition, is rendered insoluble in water.

The crystals are in the form of colourless radiating needles, which are very readily dissipated by exposure to heat; and, like the other salts of morphia, the acetate is decomposed by ammonia, potash, and soda, &c., the morphia being precipitated.

Acetate of morphia, supposing it to be anhydrous, is probably composed of

One equivalent of acetic acid .	51	or	15·23
One equivalents of morphia .	284		84·77
Equivalent .	335		100·

It has not been determined whether the crystals contain water.

Morphia combines with other acids to form salts; the meconate of morphia, which is the natural salt existing in opium, does not crystallize; it is soluble in water and in alcohol. Sulphate of morphia crystallizes in needles accumulated in bundles; it is soluble in about twice its weight of water. Bisulphate of morphia is procured by supersaturating the neutral salt with sulphuric acid; the excess of acid is to be removed by æther, which does not dissolve the bisalt. Nitrate of morphia is obtained by dissolving the alkali in the acid; it assumes at first a fine deep orange colour, which afterwards becomes yellow, and, by the continued action of the nitric acid, oxalic acid is procured; when however dilute acid is used, a neutral salt is procured in the form of stellated crystals. It is soluble in 1½ part of water. Phosphate of morphia crystallizes in cubes, or in radiating bundles, when the acid is in excess.

The general properties of the salts of morphia and the means of detecting their presence are, first, when nitric acid is dropped on crystallized morphia, a bright red or orange colour is the result; when morphia or any of its salts are acted on by a neutral solution of sesquioxide or sesquichloride of iron, a fine blue colour is the result, which disappears when an excess of acid is added, and reappears when it is saturated. Lassaigne proposes to detect the presence of the salts of morphia by evaporating the suspected solution at a temperature of 212°, and the residue treated with alcohol dissolves the salt of morphia, and probably some other matters which may have been mixed with it; by spontaneous evaporation of the alcoholic solution the salt of morphia crystallizes; from these, redissolved, ammonia throws down a precipitate which is recognised to be morphia by its bitter taste, alkalinity, solubility in alcohol, and loss by the action of iodic acid. Other vegetable alkalis combine with iodic acid to form iodates; but when a solution of iodic acid is brought into contact with morphia or its salts, the liquid assumes a reddish brown colour, and exhales the peculiar smell of iodine, and its presence may also be detected by starch. According to Serullas, who proposed this test, a grain of morphia in 7000 grains of water may be detected by it. [PAPAVER.]

MORPHNUS, Cuvier's name for a genus of *Falconidæ*. [FALCONIDÆ, vol. x., p. 176.]

MORPHOLOGY. [METAMORPHOSIS OF PLANTS.]

MORRIS DANCE. Douce, in a dissertation on the antient English Morris Dance at the end of the second volume of his 'Illustrations of Shakspere,' affirms that both English and foreign glossaries uniformly ascribe the origin of this dance to the Moors; although the genuine Moorish or Morisco dance was, no doubt, very different from the European Morris. Strutt, in his 'Sports and Pastimes of the People of England,' has cited a passage from the play of 'Variety,' 1649, in which the Spanish Morisco is mentioned; and this, Mr. Douce adds, not only shows the legitimacy of the term Morris, but that the real and uncorrupted Moorish dance was to be found in Spain, where it still continues to delight both natives and foreigners under the name of the fandango. The Spanish morris was also danced at puppet-shows by a person habited like a Moor, with castanets; and Junius has informed us that the morris-dancers usually blackened their faces with soot, that they might the better pass for Moors.

It has been supposed that the morris-dance was first brought to England in the time of Edward III., when John of Gaunt returned from Spain (Peck's *Memoirs of Milton*, p. 135); but it is more probable that we had it from our Gallic neighbours, or even from the Flemings. Few if any vestiges of it can be traced beyond the reign of Henry VII., about which time, and particularly in that of Henry VIII., the churchwardens' accounts of numerous parishes show that the morris-dance made a considerable figure at parochial festivals.

The hobby-horse, which once performed the principal character in the dance, was a light frame of wicker-work, furnished with a pasteboard head and neck of a horse. This was buckled round the waist, and covered with a foot-cloth which reached to the ground, and concealed at once the legs of the performer and his juggling apparatus. Thus equipped, he pranced and curvetted in all directions, neighing, and exhibiting specimens of boisterous and burlesque horsemanship. Besides the hobby-horse, there were, the fool or buffoon of the party; May or maid Marian, and her paramour a friar; a serving-man, a piper, and two Moriscoes. The dress of these personages is described by Fletcher in his 'Women Pleased,' when he says,—

> 'Where are your bells then,
> Your rings, your ribbands, friend, and your clean napkins,
> Your nosegay in your hat, pinn'd up?' &c.

The napkins are still used in what remains with us of the morris-dance. Gifford remarks, 'When the right good-will with which these persons capered is taken into consideration, the clean napkin, which was never omitted, will not appear the least necessary part of the apparatus.' Thus Clod, in the masque of 'The Gipsies,' observes, 'They would be morris-dancers by their gingle, but they have no napkins.' Maid Marian was the lady or queen of the May.

(Douce's *Illustrations of Shakspere and of Antient Manners*; Brand's *Popular Antiquities*, 4to. ed., vol. i, pp. 208, 209; Strutt's *Sports and Pastimes*, 4to.; Gifford's *Ben Jonson*, vol. ii., pp. 50, 51.)

MORRISON, ROBERT, the first Protestant missionary to China, was born at Morpeth, Northumberland, January 5, 1782. His parents were respectable and worthy persons in humble life. After receiving some elementary instruction in English, writing, and arithmetic, in a school conducted by a maternal uncle at Newcastle, he was apprenticed at a very early age to his father. In 1799 he commenced a course of religious reading and study. In 1801 he studied Hebrew, Latin, and theology, under the superintendence of a Presbyterian minister of the town, by whom he was introduced, in 1803, to the committee and tutors of Hoxton (now Highbury) Academy, as a fit person to be received into that institution. In May, 1804, he offered his services as a missionary to the London Missionary Society, and being accepted, he removed from Hoxton to the Mission College at Gosport. In August, 1805, he commenced the study of Chinese under a native teacher. In January, 1807, he was ordained as a missionary, and in September of the same year he arrived at Canton. Before leaving England he had procured from the British Museum a 'Harmony of the Gospels,' and the 'Pauline Epistles,' translated into Chinese by an unknown Roman Catholic Missionary; and the Royal Asiatic Society lent him a manuscript Latin and Chinese dictionary. In 1808 Mr. Morrison was appointed translator to the East India Company's factory at Canton. In 1810 the Acts of the Apostles

in Chinese, which he had brought with him, were printed, after he had carefully revised and amended the text. In 1811 a Chinese grammar, which he had prepared about three years before, was sent to Bengal to be printed, but after many delays, it did not issue from the press until 1815, when it was printed at Serampore, at the expense of the East India Company. In 1812 the Gospel of St. Luke in Chinese was printed, and by the beginning of 1814, the whole of the New Testament being ready for the press, the East India Company sent out a press and materials, and a printer to superintend the printing of the work. In 1813 the London Missionary Society sent out the Rev. (afterwards Dr.) Milne to assist Morrison, and they proceeded with the translation of the Old Testament. In 1815 the Book of Genesis and the Psalms were printed. In the following year the Chinese dictionary was finished, and before the end of 1821 was printed by the East India Company at a cost of 15,000*l*. In 1817 the university of Glasgow conferred upon Mr. Morrison the degree of D.D. The Anglo-Chinese College, for Chinese and English youth, which he had projected, was also commenced. He published in the same year 'A View of China for Philological Purposes' in English, and a translation of 'Morning and Evening Prayers of the Church of England' into Chinese. The translation of the Bible was completed in 1818. From 1810 to 1818 the British and Foreign Bible Society had voted the sum of 6000*l*., at seven different times, to assist in the printing and publication. The Old Testament formed 21 vols. 12mo. The Book of Job and the Historical Books were translated by Dr. Milne, and the other portions by Dr. Morrison. Of the New Testament Dr. Morrison had translated the four Gospels, and from Hebrews to the end. In 1824 Dr. Morrison came to England, and was introduced to King George IV., to whom he presented a copy of the Scriptures in Chinese. During his visit he endeavoured to promote the study of Chinese literature in England. His first wife, whom he married in 1808, having died in 1821, he married Miss Armstrong, of Liverpool, in 1826, and soon afterwards sailed for China. His time was now occupied in preaching, translating, superintending the distribution of printed works, and promoting education. In 1832 he wrote to his friends in England:—'I have been twenty-five years in China, and am beginning to see the work prosper. By the press we have been able to scatter knowledge far and wide.' In the midst of these occupations Dr. Morrison died, August 1, 1834, at Canton. His coadjutor, Dr. Milne, who died some time before, said of Morrison, that 'his talents were rather of the solid than the showy kind; fitted more for continued labour than to astonish by sudden bursts of genius; and his well-known caution fitted him for a station where one false step, at the beginning, might have delayed the work for ages.'

The translation of the scriptures, the great object of Dr. Morrison's life, was given to the world 'not as a perfect translation.' Dr. Morrison says he studied 'fidelity, perspicuity, and simplicity;' 'common words being preferred to classical ones.' The authorised English version was followed. Dr. Morrison always explicitly stated that the Chinese manuscript in the British Museum was 'the foundation of the New Testament;' which, he says, 'I completed and edited.'

The translators contemplated the improvement of their work at some future period, 'expecting that they should be able to sit down together and revise the whole.' This expectation was never realised; Dr. Milne died in 1822, and the correction of errors and the verbal alterations made by Dr. Morrison were not of great importance. The New Testament remains in much the same state as it was in 1814, and the Old Testament as it was in 1820. Towards the latter part of his life, Dr. Morrison became more and more confirmed in the necessity of a thorough revision, and he anticipated the probability of this being effected by his son, who however, on the death of his father, was selected to succeed him as the translator to the Superintendents of British Trade at Canton, and could not therefore devote his time to this object. It is no disparagement to Dr. Morrison to assert, that this revision of his work is necessary: it is a first version into the most difficult language in the world.

Two converted Chinese of literary abilities have given the following opinions of its merits. One of them says it exhibits a great number of redundancies and tautologies which render the meaning obscure.' The other finds it 'exceedingly verbose, containing much foreign phraseology, so contrary to the usual style of our books, that the Chinese cannot thoroughly understand the meaning, and frequently refuse to look into it.' These opinions are taken from a work entitled 'China, its State and Prospects,' by Mr. Medhurst, an active missionary who succeeded Dr. Morrison. The reader is referred for a complete view of the subject to Professor Kidd's 'Critical Essay' on Dr. Morrison's literary labours. In December, 1836, a committee of the British and Foreign Bible Society passed a resolution 'requesting the Directors of the London Missionary Society to take the necessary steps for procuring such a revision of Dr. Morrison's work as appears to have been contemplated by the Dr. himself;' with a promise of defraying all the reasonable expenses of the work. In February, 1837, the directors resolved upon taking 'the recommendation of the Bible Society into their serious consideration, in the hope of securing a careful revision of the existing version, at as early a time as may be practicable.' Here the matter at present (August, 1839) rests.

From 1810 to 1836, 751,763 copies of works, consisting of eight million pages, were printed in the Chinese and Malay languages at Canton, Malacca, Batavia, Penang, and Singapore. This includes 2075 complete Chinese Bibles, 9970 New Testaments, and 31,000 separate portions of Scripture in Chinese.

(Medhurst's 'China;' 'Evangelical Magazine,' March and April, 1835. 'Memoirs of the Life and Correspondence of Robert Morrison, D.D., compiled by his widow,' to which is appended, 'A Critical Essay on the Literary Labours of Dr. Morrison,' by the Rev. S. Kidd, Professor of Chinese in the University College, 2 vols. 8vo., Lond., 1839.)

MO'RRHUA, a genus of fishes of the order *Malacopterygii* and section *Subbrachiales*.

The Common Cod-fish may be regarded as the type of this genus, which also contains the Haddock and several other species, all of which have the ventral fins pointed and situated under, or rather in advance of, the pectorals, three dorsal fins, two anal fins, and the chin furnished with a barbule.

The Common Cod (*Morrhua vulgaris*, Cuv.; *Gadus Morrhua*, Linn.) is usually about three feet in length, but sometimes attains a much larger size, and weighs from sixty to seventy pounds. The upper parts of the head and body are of an olive brown colour, mottled with yellowish; the under parts and the lateral lines are white, and the fins are dusky. The proportions of a specimen three feet in length are as follows:—The length of the head compared with that of the body (not including the tail-fin) is as one to two and a half; the depth of the body is equal to the length of the head; the first dorsal fin commences in a vertical line just behind the origin of the pectorals; the second dorsal commences in a line over the anal opening, and terminates opposite the hinder point of the first anal fin; the third dorsal and the second anal both commence and terminate in the same vertical line; the tail is truncated.

The Cod-fish is an inhabitant of the northern seas. In this country it is found on all parts of the coast; and 'in the United Kingdom alone this fish, in the catching, curing, the partial consumption, and sale, supplies employment, food, and profit, to thousands of the human race.'

The account of the mode of fishing, &c., given in that most excellent work the 'History of British Fishes,' is as follows:—'The Cod-fish is very voracious, a favourable circumstance for the fishermen, who experience little difficulty in taking them with almost any bait, whenever a favourable locality is ascertained. As these fishes generally inhabit deep water, from twenty-five to forty and even fifty fathoms, and feed near the ground on various small fishes, worms, crustacea, and testacea, their capture is only attempted with lines and hooks. Two sorts of lines, adapted for two very different modes of fishing, are in common use. One mode is by deep-sea lines, called bulters, on the Cornish coast; these are long lines, with hooks fastened at regular distances along their whole length by shorter and smaller cords called snoods; the snoods are six feet long each, and placed on the long line twelve feet from each other, to prevent the hooks becoming entangled. Near the hooks these shorter lines, or snoods, are formed of separate threads loosely fastened together, to guard against the teeth of the fish. Some variations occur at different parts of the coast as to the number of hooks attached to the line, as well as in the length of the snood; but the distance on the long line

between two snoods is always double the length of the snood itself. Buoys, buoy-ropes, and anchors or grapples, are fixed one to each end of the long line. The hooks are baited with sand-launce, limpet, whelk, &c. The lines are always laid, or, as it is termed, shot, across the tide, for if the tide runs upon the end of the line, it will force the hooks together, by which the whole tide's fishing is irrecoverably lost: they are deposited generally about the time of slack water, between each ebb and flow, and are taken up or hauled for examination after having been left for about six hours, or one flood or ebb.

'An improvement upon this more common plan was some years ago suggested by Mr. Cobb, who was sent to the Shetlands by the Commissioners appointed for the Improvement of the Fisheries. He fixed a small piece of cork within a certain distance of the hook (about twelve inches), which suspended and floated the bait so as to prevent its falling on the ground, by which method the bait was more freely shown to the fish, by the constant and variable motion produced upon it by the tide. In the old way the bait was frequently hid from the fish by being covered with sea-weed, or was consumed by some of the numerous star-fish and crabs that infest the ground.

'The fishermen, when not engaged in shooting, hauling, or rebaiting the long lines, fish with hand-lines, armed with two hooks kept apart by a strong piece of wire: each fisherman manages two lines, holding one line in each hand; a heavy weight is attached to the lower end of the line, not far from the hooks, to keep the bait down near the ground, where the fish principally feed. These two modes of line-fishing are practised to a great extent nearly all round the coast; and enormous quantities of cod, haddock, whiting, coal-fish, pollack, hake, ling, torsk, and all the various flat-fish, usually called by the general name of white-fish, are taken.

'Of cod-fish alone the number taken in one day is very considerable; from four hundred to five hundred and fifty fish have been caught on the banks of Newfoundland in ten or eleven hours by one man; and a master of fishing-vessels trading from the London market told me that eight men fishing under his orders off the Dogger Bank, in twenty-five fathoms water, have taken eighty score of cod in one day. These are brought to Gravesend in stout cutter-rigged vessels of eighty or one hundred tons burthen, called store-boats, built for this traffic, with a large well, in which the fish are preserved alive; and of these a portion is sent up to Billingsgate market by each night tide.

'Well-boats, for preserving alive the fish taken at sea, came into use in this country early in the last century: they are said to have been first built at Harwich about 1712. The store-boats remain as low down as Gravesend, because the water there is sufficiently mixed to keep the fish alive. If they were to come higher up, it would kill them.

'A change has lately taken place from the Cod having shifted their ground. Formerly the Gravesend and Barking fishermen obtained no Cod nearer than the Orkneys or the Dogger Bank; but for the last two or three years the supply for the London market has been obtained by going no farther than the Lincolnshire and Norfolk coasts, and even between that and London, where previously very few fish could be obtained. . . .

'In a natural state the Cod spawns about February; and nine millions of ova have been found in the roe of one female. The Cod is in the greatest perfection as food from the end of October to Christmas. It may, in fact, be said of the whole of the family of *Gadidæ*, that they are in the best condition for the table in the cold months of the year. The young of the Cod, about six inches long, abound at the mouth of the Thames and Medway throughout the summer: as autumn advances they gain size and strength, and are caught, from twelve to sixteen inches in length, by lines, near the various sandbanks in the channel. When of whiting size, they are called Codlings and Skinners; and when larger, Tamlin Cod.'

The Haddock (*Morrhua æglefinus*, Cuv.), a common fish in our markets, is of a smaller size than the cod, which it greatly resembles. In a specimen twenty inches long, the length of the head, compared with that of the body, without including the tail, is as one to two and a half; the depth of the body is less than the length of the head: the fins are situated nearly as in the cod, but they are proportionally higher, especially the anterior dorsal, which is pointed: the tail fin has its posterior edge emarginated. Its colour is usually paler than the common cod, the back is palish brown, the belly is silvery white, and the lateral line is black; a blackish patch is situated on the side of the body behind the pectoral fins, and sometimes extends over the back and unites with the corresponding spot on the opposite side; the dorsal fins and tail are greyish, and the pectoral and ventral fins are paler.

This fish frequents for the most part the same localities as the common cod, being found in the northern seas. It occurs all round the coast of Great Britain and Ireland, but is said not to exist either in the Baltic or Mediterranean. It is chiefly caught with long lines baited with pieces cut from a herring or sand-launce.

In the 'Règne Animal,' it is said that when the haddock is salted, it is called *hadou*, after the English name *hadok*; and in the 'History of British Fishes,' Mr. Yarrel states, that 'the French fishermen call the haddock hadot, whence probably our name was derived.

Besides the two above-mentioned species of *Morrhua*, the following are enumerated and described as species occurring on the British coast:—The Dorse (*Morrhua Callarias*), the Bib or Pout (*M. lusca*), the Poor or Power Cod (*M. minuta*), and the Speckled Cod (*M. punctata*). (Yarrell's *History of British Fishes*.) [FISHERIES.]

MORSE, a name for the *Walrus*.

MORTAGNE. [ORNE.]

MORTAIN. [MANCHE.]

MORTALITY, BILLS OF. [BILLS OF MORTALITY.]

MORTALITY, LAW OF. In this article we intend to confine ourselves to some account of our present knowledge, theoretical and practical, of the laws which are found to regulate mortality among mankind in this country.

Uncertain as is the life of any one individual, it is now very well known that if two different numbers of individuals, at or near the same age, be taken, the number that will be left at the end of a few years will be nearly the same, if they exist during that time under similar circumstances. No tables, however different the station and circumstances of the persons from whose lives they are made, differ from one another by anything like the amount which might be supposed likely by one who turns his thoughts rather to the existence of one individual than of a large number. A little consideration will make the probability of something like permanence in the distribution of mortality very great *à priori*. That harvests fluctuate in goodness is very well known; but it is also obvious that if the fluctuations upon a whole country had been as great as those upon an individual field, the human race must long ere this have been starved off the face of the earth. If, in the same manner, the mortality of races had varied as much as that of families, it is impossible that the population of any country could have gone on in a gradual and regulated state of increase; or supposing that large fluctuations had compensated each other, the consequence must have been such a disproportion of the numbers living at different ages as it never has occurred to any one to imagine possible.

The law of mortality, theoretically speaking, is a mathematical relation between the numbers living at different ages; so that, having given a large number of persons alive at one age, it can be deduced by the law what number shall survive any given number of years: practically speaking, it is, in the absence of such a mathematical law, the exhibition in a table of the numbers surviving at the end of each year. Thus DE MOIVRE'S HYPOTHESIS (namely, the supposition that out of 86 persons born one dies every year, till all are extinct) is an asserted theoretical law of mortality; while the Carlisle table, presently given, is a practical one.

If y represent the number of persons living at the age of x, out of a certain number a at a certain previous age (usually the time of birth), then if a line varying with x be made the abscissa of a curve, and another varying with y its ordinate, this curve may be called the curve of mortality. Its form, as deduced from a given set of observations, may lead, by comparison with known curves, to an equation which, more or less accurately, connects y and x.

Besides De Moivre's hypothesis, others have been given, the principal of which we shall notice in order.

A curve following a mathematical law may be drawn through any points, however great their number, or irregular their distribution; but the greater the number of points, the more complex will be the equation of the curve. With an equation of a high degree (the tenth perhaps, or

the twelfth), any given table of mortality might be very nearly represented; but such complexity would be useless, and it has therefore never been attempted. Similarly, by using arcs of different curves, a near representation might be attained; but such a method, being practicable in many different ways, would not possess the interest attaching to one simple and uniform law, and would only attract attention by offering facilities for the actual calculation of life-contingencies.

In 1765 Lambert presented an equation of the following form, as representing very closely the London table (ϵ is the base of Napier's logarithms):—

$$y = 10000\left(\frac{96-x}{96}\right)^2 - 6176\left\{\epsilon^{-\alpha x} - \epsilon^{-\beta x}\right\}$$

α being $= 1 : 13{\cdot}682$, and $\beta = 1 : 2{\cdot}43114$, and y being the number surviving at the age of x, out of 10,000 born. This form, if it could be made to represent other tables, by an alteration in the constants, would be one of great practical utility; but we are not aware of any attempt having been made to extend it.

Mr. Benjamin Gompertz, in 1825, presented to the Royal Society a memoir 'On the Nature of the Function expressive of the Law of Human Mortality.' As this ingenious paper contains a deduction from a principle of high probability, and terminates in a conclusion which accords in a great degree with observed facts, it must always be considered as a very remarkable page in the history of the inquiry before us. We enter into some detail of it the more readily, that it is necessary as an act of justice to Mr. Gompertz, whose ideas have been adopted by a recent writer on the subject, without anything approaching to a sufficient acknowledgment.

There is in the human constitution a power of resisting the effects of disease, which increases from birth up to a certain age, and diminishes from that time forwards; the evidence of such diminution being the increased proportion of deaths in a given time. The proportion is found, in most tables, not to be altered by equal quantities in equal times, but to diminish in a greater ratio as life goes on. Mr. Gompertz assumes that the 'power to oppose destruction' loses equal proportions* in equal times; so that the intensity of mortality, supposed inversely proportional to this power, must be represented by the formula aq^x, where a is its value at the commencing age from which x years are reckoned, and q a constant depending on the rate of increase of the intensity. If therefore y be the number living at the end of x years, $y . aq^x dx \times b$ is the decrement of that number in the time dx, where b is another constant; and this gives $dy = - abq^x y dx$, which integrated is of the form

$$y = lg^{(q^x)}$$

where q, l, and g are to be determined. This can be done by three values of y out of the given table; and the result, hitherto purely hypothetical, can then be compared with the other parts of the table, by calculation of the values of the formula for different ages. The more convenient form of the above is

$$\log y = \log l \pm \text{no. wh. log. is } (\text{log. } \log g + x \log q .$$

where $\log \log g$ is taken without reference to the sign of $\log g$, and the upper or lower sign is used according as g is greater or less than unity.

Among other comparisons, Mr. Gompertz has made one with the Carlisle table from the age of 10 to that of 60, and another (deducing different values of l, g, and q) from 60 to 100. The two formulæ obtained are, using $\log^{-1}$ for the phrase 'no. whose logarithm is,' and x meaning the age of the parties,

$$\log y = 3{\cdot}88631 - \log^{-1}\{2{\cdot}75526 + {\cdot}0126\ x\}$$

$$\log y = 3{\cdot}79657 - \log^{-1}\{\bar{3}{\cdot}74767 + {\cdot}02706\,x\}$$

In the first set of ages the discordance between the formula and the table is only in one instance as great as half a year; that is, there is only one instance in which the number deduced from the formula as alive at a given age represents the number living in the table at an age so distant from the given age as half a year. Several other comparisons, with other tables and different constants, give equally satisfactory results. Few who know the best tables of mortality will be inclined to think that their probable error is within half a year; so that, as we now stand, Mr. Gompertz's principle, namely, 'that equal proportions of the "power to oppose destruction" are lost in successive small equal times,' is as well established for a large portion of life as any of the tables.

* The word in the eighth page of the memoir cited is *portions*, which is a misprint or an oversight, as the formula immediately following shows. If x be the time, $a - bx$ loses equal portions in equal times, and $a . b^{-x}$ equal proportions.

We now come to the practical exhibition of the law of mortality in tables. A very good account of the history of the subject, by Mr. Milne, appears in the 'Encyclopædia Britannica' (new edition), article 'Mortality,' the references in which may be consulted by those who desire information on the state of the question in foreign countries. We shall in this article confine ourselves principally to English tables.

The obvious and simple mode of forming a table of mortality would be to take a large number of infants born alive, all of the same sex and in the same station of life. If the numbers left alive at the end of every year were noted, until all had become extinct, a column of ages, accompanied by an opposite column noting the number of survivors, would be a table of mortality in the most usual form. Such a table might be called a table of decrements. Let l_0 represent the number born, and l_x the number who survive to the age x.

The formation of such a table might require a century of observation. To avoid this, the law of mortality must be assumed stationary; that is, it must be presumed that, out of those who reach, say age 70, the proportion who die in a year is now what it will be when an infant new-born reaches that age. This being assumed, let the members of a community be counted, and their ages registered; at the end of a year it will appear what proportion of each age has died. If the process be repeated in succeeding years, other sets of events are obtained, which may all be put together into one table, when the number has become large enough to secure the observed events representing the average, and to destroy the effects of accidental fluctuations. If then altogether k_x persons have attained the age x, of whom k_{x+1} have survived to the age $x+1$, it follows that the proportion who die in a year is $(k_x - k_{x+1}) : k_x$, which may be represented by m_x. A table of the values of m_x might be called a table of the yearly rates of mortality.

A table of yearly rates may be converted into a table of decrements, as follows. Assume a number l_0 to be born, then from the table of yearly rates,

$$l_1 = (1 - m_0)\, l_0,\ l_2 = (1 - m_1)\, l_1, \text{ \&c.}$$

If the population, say of a town, remained unaffected, or sensibly unaffected, by immigration or emigration, that is, if all who were born in the place, and no others, were registered in the burials of the place, the burial registers would form a mortality-table, provided the rate of increase of the population were steady and known. For, firstly, if the population had remained stationary for a long time preceding the commencement of registration, the yearly deaths and births being equal, and if the mortality had also remained stationary, the burials of any one year, the parties being distributed according to age, would show the law of motality as follows:—Suppose the registers of a year showed that M_0 died in their first year, M_1 in their second year, and so on, the equality of births and deaths shows that $M_0 + M_1 + M_2 + \ldots$ must have been born in that year, and the stationary character of the law of mortality being assumed, it follows that of $M_0 + M_1 + \ldots$ persons born, it is the law of the mortality that M_0 die in their first year, or that $M_1 + M_2 + \ldots$. survive; similarly that $M_2 + M_3 + \ldots$ survive two years, and so on. But if the population be in a state of increase, and if the annual ratio of increase be that of $1 : 1 + \mu$, those who die at the age $x - 1$ and x cannot be incorporated in the same table, since the first are a portion of a table beginning with a larger number of births. The former then must be reduced, or the latter increased, in the proportion of $1 : 1 + \mu$: so that if M_0, M_1, &c. be the deaths in the first, second, &c. years of age by the register, the table must run thus: of

$$M_0 + M_1\,(1+\mu) + M_2(1+\mu)^2 + \ldots .$$

persons born, M_0 die in their first year, $M_1\,(1+\mu)$ in their second, and so on.

A table of mortality may also be given in the form of a table of the mean durations of life, calculated as in LIFE, MEAN DURATION OF. Or the table of mean durations may be calculated from the table of yearly rates, as follows:—Let e_n be the mean duration of the lives aged n, and m_n the yearly rate at the same age: then

$$e_n - \tfrac{1}{2} = (1 - m_n)(e_{n+1} + \tfrac{1}{2})$$

by which, beginning from the end of life, the mean duration at each age may be computed from that at the age next higher.

Various tables of these several kinds have been constructed, beginning with that made by Halley from the town of Breslau, and ending with that formed by the Equitable Insurance Office from its own materials. If we were to look to the wants of the subject, whether as a physical investigation or a statistical one, we should find that it is everywhere in the merest infancy. The fact of a difference of mortality between the two sexes is established, and it also seems to be known that where the occupations of females are not above their strength, their mortality is less than that of males; but no settled determination of the amount of difference has been obtained. As to whether married or single life is the longest, whether the age of the parents, or the relative age, affects the mortality of the children, whether the earlier children of a marriage differ in their law of mortality from the later, &c., we have no information at all. In some foreign countries, as in Sweden and Belgium, the attention paid by the government to statistical subjects has produced some results which are worth a good deal; the reader may consult the article in the *Encylopædia Britannica* already cited for reference to them. We shall now give merely the dates and titles of the most remarkable earlier tables connected with the subject.

A.D. 1538, parish registers first kept in England.

1540-41. The statute 32 Henry VIII., c. 28, enabling ecclesiastical persons and corporations to grant leases for *three lives*, or *twenty-one years*. From this permission springs, we think, much of the attention which has been paid to the subject of life leases in England. It gave rise to certain tables of the value of leases which were called 'Æcroid's Tables,' and which were put together, as was thought by later writers, about the end of the reign of Henry VIII. They assume a rate of interest greater than 11 per cent. After the Restoration, when the interest of money had very much fallen, the ecclesiastical lessors began to raise their fines. This occasioned great dissatisfaction, and frequent representations to the House of Commons, which, though it passed no law, in several cases recommended to particular bishops, &c. an adherence to the old rule. Attention began to be turned towards the actual value of life. In 1662 John Graunt published his 'Natural and Political Observations on the Bills of Mortality,' often reprinted. In 1674, Sir William Petty, in a paper in the 'Philosophical Transactions,' proposed a law of mortality of the following kind: the probability of one life surviving another, after the age of 16, is inversely as the square roots of the ages. In 1686 were published the well known 'Tables for renewing and purchasing the leases of Cathedral Churches and Colleges,' the methods of which were certified to be correct by Newton, and which there fore have been frequently called Newton's Tables. About 1720, if not before, a letter called 'The Value of Church and Colleges Leases considered,' was appended to these tables, and a very sharp controversy took place, which produced a great many pamphlets; the party of the lessees appealing to custom, the lessors showing from the value of life and interest of money that the church landlord dealt more leniently with his tenant than the layman, as was indeed the case. Among the writings which arose out of this controversy was 'The Gentleman's Steward instructed,' 1730, by John Richards, containing the most complete tables of annuities which had been published.

The work of Graunt and the political essays of Sir William Petty preceded, and probably stimulated the attempt of Halley to construct (A.D. 1692) a table from the bills of mortality at Breslau, which was published in 1693. In 1699 came Dr. Davenant's 'Essay,' &c. containing extracts from some tables by Gregory King (afterwards published entire), which Mr. Milne states to represent tables since made with great accuracy. Kersseboom's tables of lives (constructed from Dutch registers of annuitants) appeared in 1738, 1740, and 1742. De Moivre's 'Treatise on Annuities,' containing his celebrated hypothesis, was published in 1724; and Thomas Simpson's work on the same subject, containing a table deduced from London observations, in 1742. Deparcieux, in 1746, published his 'Treatise on Annuities,' containing his tables deduced from the lives of French annuitants, as well as from monks and nuns. These were the first tables in which male and female life were distinguished from each other.

The works of Price, Baily, Milne, &c., contain altogether a large number of tables, which we shall here no further notice than to give references to the works in which they may be found, with other matters connected with the same subject.

'Observations on Reversionary Payments,' by Richard Price, D.D., seventh edition, edited by William Morgan, London, Cadell and Davies, 1812.

'The Doctrine of Annuities and Assurances,' by Francis Baily, London, Richardson, 1816. This work, now out of print, has been lately translated into French, under the title 'Théorie des Annuités Viagères,' traduit de l'Anglais per Alfred de Courcy, Paris, Bachelier, 1836.

'A Treatise on the Valuation of Annuities and Assurances,' by Joshua Milne, London, Longman and Co., 1815.

'On the Natural and Mathematical Laws concerning Population, Vitality, and Mortality,' by Francis Corbaux, London, 1833. This work contains a large number of tables.

Reports (two in number) of Select Committees of the House of Commons on the Laws respecting Friendly Societies. Ordered to be printed, July 5, 1825, and June 29, 1827.

'Report of John Finlaison, actuary of the national debt, on the evidence and elementary facts on which the tables of life annuities are founded.' Ordered by the House of Commons to be printed, March 31, 1829.

'Library of Useful Knowledge,' treatise 'On Probability.'

'Treatise on Friendly Societies,' by Charles Ansell, &c., London, Baldwin and Cradock, 1835.

'Tables showing the total number of persons insured in the Equitable Society,' &c., by Arthur Morgan, London, 1834.

Mr. Rickman's various Reports on the Population Census contain tables deduced from them.

'Recherches sur la Reproduction et la Mortalité,' &c., par MM. Quetelet et Smits, Bruxelles, 1832; and 'Sur l'Homme, &c., ou Essai de Physique Sociale,' 2 vols., par A. Quetelet, Paris, Bachelier, 1835. These works exhibit for Belgium what we could wish to see imitated in England.

We shall now proceed to give some tables of mortality, namely, the Northampton and Carlisle tables, those of the Equitable Insurance Office, and Mr. Ansell's Friendly Societies' table. We shall give a brief description of each.

1. Northampton Table. This table was formed by Dr. Price from the burial registers at Northampton, between 1741 and 1780. He has not distinctly described the process by which he formed it. This table was for a long time the only one used by the insurance offices. It is now known to give the probabilities of life too low at the younger and middle ages. Some of this (but probably not all) is due to the increased value of life in England since the middle of the last century. This table contains both males and females in nearly equal numbers. The accordance of the Northampton Table with De Moivre's Hypothesis at the middle ages of life is remarkably close. (Price, *Obs. on Rev. Paym.*, vol. ii., p. 94.)

2. The Carlisle Table. The materials of this table were obtained by Mr. Milne from a tract published by Dr. Heysham of Carlisle in 1797, containing the bills of mortality from 1779 to 1787, both inclusive. The proportion is ten females to nine males. From the verifications which this table has since received, it must be considered as the most correct representative of healthy life in England which exists. (Milne *On Annuities*, p. 404.)

3. The Equitable Table. The tract in which this is found is cited above. It represents the experience of the Equitable Society from 1760 to 1829, and agrees closely at the middle ages with the Carlisle Table. The agreement would be a little closer in most parts but for the following circumstance. In the formation of this table it is presumed that all those who discontinued their insurance lived, one with an-

other, one-half of their year of discontinuance in the Society. Now (throwing aside short insurances, which are always very small in number) the modes of discontinuance are only abandonment by neglect to renew the premium, and sale to the Society. In the former case the parties live the whole year of discontinuance in the Society, since their intention not to renew would be no bar to a claim on the part of their executors if their death took place during a year at the beginning of which premium had been paid; and it is well known that in the earlier history of every insurance office, abandonments were much more frequent than sales. And even in the case of sales to the office, it may reasonably be assumed, unless proof to the contrary were shown, that they take place, for the most part, shortly before a new premium becomes due, parties frequently choosing to take the benefit of the insurance as long as they can, and to sell when a new payment is approaching. It must therefore be supposed (unless, as before hinted at, specific proof from the records of the office be produced to the contrary) that the discontinuants, or a very large majority of them, lived the whole year of discontinuance in the office. This will make the mortality a little less than that represented in the table, though not much.

There is also a point on which, if our information be correct, the method of forming this table has been misapprehended. Those who study the subject are aware of the thing to which we refer (*Enc. Metr.*, article 'Mortality,' part ii., § 53, note), and will therefore comprehend the following. It is, we understand, the practice of the Society in question to make up the registers on the first day of January, at which period every person insured during the previous year is put down as being of the *office age* which he had at his entrance. Now this office age means the age at the next birthday; that is, one with another, parties do not attain their office age till they have lived half a year in the Society. But on each first of January the parties insured during the previous year have, one with another, lived half a year in the Society, so that they are correctly stated as being of their office age when the registers are made. The preface of this very valuable table is not sufficiently explicit on this and several other points.

4. The Friendly Societies' Table. The materials for this table were collected by the Society for the Diffusion of Useful Knowledge, and were discussed by Mr. Ansell in the work cited above, which should be in the hands of every one interested in the excellent institutions of which it treats. It embraces the history, as to mortality, of 24,323 years of life, among the labouring classes, from all parts of England indiscriminately, and from 1823 to 1828.

I. *Decrements of Human Life, according to the Northampton, Carlisle, Equitable, and Friendly Societies' Tables.*

Age.	Northampton.	Decrements.	Carlisle.	Decrements.	Equitable.	Decrements.	Friendly Societies.	Decrements.	Age.
0	11650	3000	10000	1539	..				0
1	9650	1367	8461	682	..				1
2	7283	502	7779	505	..				2
3	6781	335	7274	276	..				3
4	6446	197	6998	201	..				4
5	6249	184	6797	121	..				5
6	6065	140	6676	82	..				6
7	5925	110	6594	58	..				7
8	5815	80	6536	43	..				8
9	5735	60	6493	33	..				9
10	5675	52	6460	29	5000	36			10
11	5623	50	6431	31	4964	36			11
12	5573	50	6400	32	4928	36			12
13	5523	50	6368	33	4892	36	8669	52	13
14	5473	50	6335	35	4856	36	8617	54	14
15	5423	50	6300	39	4820	36	8563	56	15
16	5373	53	6261	42	4784	36	8507	58	16
17	5320	58	6219	43	4748	36	8449	60	17
18	5262	63	6176	43	4712	36	8389	62	18
19	5199	67	6133	43	4676	35	8327	64	19
20	5132	72	6090	43	4641	34	8263	66	20
21	5060	75	6047	42	4607	33	8197	68	21
22	4985	75	6005	42	4574	33	8129	70	22
23	4910	75	5963	42	4541	33	8059	71	23
24	4835	75	5921	42	4508	33	7988	73	24
25	4760	75	5879	43	4475	34	7915	75	25
26	4685	75	5836	43	4441	34	7840	77	26
27	4610	75	5793	45	4407	34	7763	79	27
28	4535	75	5748	50	4373	34	7684	81	28
29	4460	75	5698	56	4339	34	7603	83	29
30	4385	75	5642	57	4305	35	7520	85	30
31	4310	75	5585	57	4270	35	7435	87	31
32	4235	75	5528	56	4235	36	7348	89	32
33	4160	75	5472	55	4199	37	7259	91	33
34	4085	75	5417	55	4162	38	7168	93	34
35	4010	75	5362	55	4124	38	7075	95	35
36	3935	75	5307	56	4086	39	6980	98	36
37	3860	75	5251	57	4047	40	6882	100	37
38	3785	75	5194	58	4007	42	6782	102	38
39	3710	75	5136	61	3965	43	6680	105	39
40	3635	76	5075	66	3922	43	6575	107	40
41	3559	77	5009	69	3879	44	6468	109	41
42	3482	78	4940	71	3835	44	6359	111	42
43	3404	78	4869	71	3791	44	6248	113	43
44	3326	78	4798	71	3747	45	6135	115	44
45	3248	78	4727	70	3702	47	6020	117	45
46	3170	78	4657	69	3655	47	5903	118	46
47	3092	78	4588	67	3608	48	5785	120	47
48	3014	78	4521	63	3560	49	5665	122	48
49	2936	79	4458	61	3511	50	5543	124	49
50	2857	81	4397	59	3461	52	5419	126	50
51	2776	82	4338	62	3409	55	5293	129	51
52	2694	82	4276	65	3354	58	5164	131	52
53	2612	82	4211	68	3296	62	5033	134	53
54	2530	82	4143	70	3234	64	4899	136	54
55	2448	82	4073	73	3170	66	4763	140	55
56	2366	82	4000	76	3104	70	4623	143	56
57	2284	82	3924	82	3034	75	4480	145	57
58	2202	82	3842	93	2959	79	4335	148	58
59	2120	82	3749	106	2880	84	4187	150	59
60	2038	82	3643	122	2796	84	4037	152	60
61	1956	82	3521	126	2703	90	3885	153	61
62	1874	81	3395	127	2618	91	3732	155	62
63	1793	81	3268	125	2527	93	3577	156	63
64	1712	80	3143	125	2434	95	3421	158	64
65	1632	80	3018	124	2339	100	3263	158	65
66	1552	80	2894	123	2239	105	3105	159	66
67	1472	80	2771	123	2134	108	2946	160	67
68	1392	80	2648	123	2026	111	2786	161	68
69	1312	80	2525	124	1915	115	2625	161	69
70	1232	80	2401	124	1800	115	2464	160	70
71	1152	80	2277	134	1685	115	2304	160	71
72	1072	80	2143	146	1570	115	2144	160	72
73	992	80	1997	156	1455	115	1984	160	73
74	912	80	1841	166	1340	115	1824	160	74
75	832	80	1675	160	1225	114	1664	160	75
76	752	77	1515	156	1111	109	1504	154	76
77	675	73	1359	146	1002	105	1350	146	77
78	602	68	1213	132	897	101	1204	136	78
79	534	65	1081	128	796	96	1068	130	79
80	469	63	953	116	700	93	938	126	80
81	406	60	837	112	607	90	812	120	81
82	346	57	725	102	517	85	692	114	82
83	289	55	623	94	432	83	578	110	83
84	234	48	529	84	349	73	468	96	84
85	186	41	445	78	276	61	372	82	85
86	145	34	367	71	215	50	290	68	86
87	111	28	296	64	165	42	222	56	87
88	83	21	232	51	123	34	166	42	88
89	62	16	181	39	89	22	124	32	89
90	46	12	142	37	67	18	92	24	90
91	34	10	105	30	49	14	68	20	91
92	24	8	75	21	35	11	48	16	92
93	16	7	54	14	24	8	32	14	93
94	9	5	40	10	16	7	18	10	94
95	4	3	30	7	9	5	8	6	95
96	1	1	23	5	4	3	2	2	96
97			18	4	1	1			97
98			14	3					98
99			11	2					99
100			9	2					100
101			7	2					101
102			5	2					102
103			3	2					103
104			1	1					104

The explanation is as follows:—Of 10,000 infants born at Carlisle, 1539 would die in their first year, and 8461 would survive, while 4000 would live to 56 and upwards. In the Equitable Table, of 3922 persons attaining the age of 40, 43 and 44 die in the two succeeding years, leaving 3835 surviving at their 42nd birthday.

Of the three species of tables, this is the most useful for mathematical deduction, and the least adapted for a com-

parative view. The best way of using them for the examination of their relative bearings is to compare the *probable life*, as it is called, of the two, that is, the time in which the numbers living are reduced one-half. Thus taking the age of 31, we see that the numbers living in the Northampton table are halved at the age of 59, while in the Carlisle table this does not happen till the age of 67.

II. *Yearly Rates of Mortality upon* 10,000 *lives according to the Northampton, Carlisle, Equitable, and Friendly Societies' Tables.*

Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.	Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.
0	2575	1539			0	56	347	190	225	309	56
1	1580	789			1	57	359	209	247	325	57
2	689	649			2	58	372	242	267	341	58
3	494	379			3	59	387	283	291	358	59
4	306	287			4	60	402	335	315	376	60
5	294	178			5	61	419	358	332	395	61
6	231	123			6	62	432	374	347	415	62
7	186	88			7	63	452	382	369	437	63
8	138	66			8	64	467	398	390	461	64
9	105	51			9	65	490	411	428	485	65
10	92	45	72		10	66	515	425	469	513	66
11	89	48	72		11	67	543	444	506	543	67
12	90	50	73		12	68	575	465	548	578	68
13	91	52	74	60	13	69	610	491	601	614	69
14	91	55	74	63	14	70	649	516	639	649	70
15	92	62	75	66	15	71	694	589	682	694	71
16	99	67	75	69	16	72	746	681	733	746	72
17	105	69	76	71	17	73	806	781	790	806	73
18	120	70	77	74	18	74	877	902	858	877	74
19	129	70	75	77	19	75	962	955	931	962	75
20	140	71	73	80	20	76	1024	1030	981	1024	76
21	148	69	72	83	21	77	1081	1074	1048	1081	77
22	150	70	72	86	22	78	1130	1083	1126	1130	78
23	153	70	73	89	23	79	1217	1184	1206	1217	79
24	155	71	73	91	24	80	1343	1217	1329	1343	80
25	158	73	76	95	25	81	1478	1338	1483	1478	81
26	160	74	77	98	26	82	1647	1407	1644	1647	82
27	163	78	77	101	27	83	1903	1509	1921	1903	83
28	165	87	78	105	28	84	2051	1588	2092	2051	84
29	168	98	78	109	29	85	2204	1753	2210	2201	85
30	171	101	81	112	30	86	2345	1935	2326	2345	86
31	174	102	82	117	31	87	2523	2162	2545	2523	87
32	177	101	85	121	32	88	2530	2198	2764	2530	88
33	180	101	87	125	33	89	2581	2155	2472	2581	89
34	184	102	91	130	34	90	2609	2606	2686	2609	90
35	187	103	92	135	35	91	2941	2858	2857	2941	91
36	191	106	95	140	36	92	3333	2800	3143	3333	92
37	194	109	99	145	37	93	4375	2593	3333	4375	93
38	198	112	105	151	38	94	5556	2500	4375	5556	94
39	202	119	108	156	39	95	7500	2333	5556	7500	95
40	209	130	110	162	40	96	10000	2174	7500	10000	96
41	216	138	113	168	41	97		2222	10000		97
42	224	144	115	175	42	98		2143			98
43	229	146	116	181	43	99		1818			99
44	235	148	120	187	44	100		2222			100
45	240	148	127	194	45	101		2857			101
46	246	148	129	200	46	102		4000			102
47	252	146	133	207	47	103		6667			103
48	259	139	138	215	48	104		10000			104
49	269	137	142	223	49						
50	284	134	150	233	50						
51	295	143	161	248	51						
52	304	152	173	254	52						
53	314	161	188	266	53						
54	324	169	198	279	54						
55	335	179	208	293	55						

Thus, of 10,000 persons attaining the age of 40, 130 die in the following year according to the Carlisle tables; while of 10,000 who attain the age of 41, 138 die in the next year. This species of table is the only one of the three which is immediately applicable to the comparison of two sets of data at and near a given age; while the one to which we now come serves to compare the total character of two sets of data from and after a given age. It also unites the fluctuations of different years, by compensation: thus looking at tables II. we should hardly suspect that closeness of resemblance between the Carlisle and Equitable tables, in the value of life, which is obvious in those marked III.

III. *Mean Duration of the lives of* 100 *individuals of every age, according to the Northampton, Carlisle, Equitable, and Friendly Societies' Tables.*

Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.	Age.	Northampton.	Carlisle.	Equitable.	Friendly Societies.	Age.
0	2518	3872			0	56	1510	1680	1634	1539	56
1	3271	4168			1	57	1463	1621	1571	1486	57
2	3779	4755			2	58	1415	1556	1509	1434	58
3	3955	4982			3	59	1368	1492	1449	1383	59
4	4058	5076			4	60	1321	1434	1391	1333	60
5	4084	5125			5	61	1275	1382	1335	1283	61
6	4107	5117			6	62	1228	1331	1279	1233	62
7	4103	5090			7	63	1181	1281	1223	1185	63
8	4079	5024			8	64	1135	1230	1168	1136	64
9	4036	4957			9	65	1088	1179	1113	1089	65
10	3978	4882	4832		10	66	1042	1127	1061	1042	66
11	3914	4804	4767		11	67	996	1075	1011	995	67
12	3849	4727	4701		12	68	950	1023	962	950	68
13	3783	4651	4635	4274	13	69	905	970	915	905	69
14	3717	4575	4569	4199	14	70	860	918	870	861	70
15	3651	4500	4503	4125	15	71	817	865	826	817	71
16	3585	4427	4436	4052	16	72	774	816	783	774	72
17	3520	4357	4370	3979	17	73	733	772	741	733	73
18	3458	4287	4303	3908	18	74	692	733	700	693	74
19	3399	4217	4235	3836	19	75	654	701	661	654	75
20	3343	4146	4167	3756	20	76	618	669	624	619	76
21	3290	4075	4097	3696	21	77	583	640	586	594	77
22	3239	4004	4027	3626	22	78	548	612	549	548	78
23	3188	3931	3956	3557	23	79	511	580	512	512	79
24	3136	3859	3884	3488	24	80	475	551	475	476	80
25	3085	3786	3812	3420	25	81	441	521	441	442	81
26	3033	3714	3741	3352	26	82	409	493	409	410	82
27	2982	3641	3670	3285	27	83	380	465	379	380	83
28	2930	3569	3598	3218	28	84	358	439	357	358	84
29	2879	3500	3526	3152	29	85	337	412	339	338	85
30	2827	3434	3453	3086	30	86	319	390	331	319	86
31	2776	3368	3381	3021	31	87	301	371	303	301	87
32	2724	3303	3308	2956	32	88	286	359	289	286	88
33	2672	3236	3236	2892	33	89	266	347	280	266	89
34	2620	3168	3165	2828	34	90	241	328	256	241	90
35	2568	3100	3093	2764	35	91	209	326	232	209	91
36	2516	3032	3022	2701	36	92	175	337	204	175	92
37	2464	2964	2950	2639	37	93	137	348	175	139	93
38	2412	2896	2879	2577	38	94	105	353	138	106	94
39	2360	2828	2809	2516	39	95	75	353	106	75	95
40	2308	2761	2740	2455	40	96	50	346	75	50	96
41	2256	2697	2669	2395	41	97		328	50		
42	2201	2634	2599	2335	42	98		307			
43	2154	2571	2529	2276	43	99		277			
44	2103	2509	2458	2217	44	100		228			
45	2052	2446	2387	2158	45	101		179			
46	2002	2382	2317	2100	46	102		130			
47	1951	2317	2247	2042	47	103		83			
48	1900	2250	2177	1984	48	104		50			
49	1849	2181	2107	1926	49						
50	1799	2111	2036	1869	50						
51	1750	2039	1966	1813	51						
52	1702	1968	1898	1757	52						
53	1654	1897	1830	1701	53						
54	1606	1828	1764	1646	54						
55	1558	1758	1699	1592	55						

To avoid decimal points, 100 persons are supposed at each age: thus, 100 persons aged thirty enjoy among them 3086 years, according to the Friendly Societies' tables, or each of them, on the average, 30·86 years. This sort of table is much the best for a running comparison of two laws of mortality.

It must be observed that the two first of the preceding sets of tables attempt a degree of minuteness which cannot be supposed to be attainable with existing data. To distinguish between the decrements of two successive years, and the percentages of the two sets of deaths, would require much greater numbers of living at the two ages than ever have been found in the materials of a table. Nor is the regularity observable in these tables also observable in the observations which produced them; this result being obtained by hypothetical adjustments, so as to attain the nearest representation, in the main, of the materials under investigation. This applies particularly to the old lives, which are but few in number, and present various diversities of fluctuation. Almost all the tables which have been constructed present some general results of utility; and we cannot but think that writers on this subject, by attending too much to minute comparison, and not enough to general indications, have not made all the legitimate deductions which the materials before them would have afforded. We

proceed to some general account of the state of mortality, restricting ourselves to the last and present centuries, to life in England only, and to the general variations of mortality and the relative mortality of the sexes.

The circumstance which must strike every one as most remarkable, is the great increase which has taken place in longevity. To put this in a clearer light, we shall collect various tables of the mean duration of life, specifying the epochs of their collection. The tables formed from male lives only, have a capital letter; from female lives only, a small letter; from both, a capital and a small letter. At the bottom of each table is given the period in which all or most of the lives became extinct. The number in the table is the number of years enjoyed by ten individuals: thus in table T, at the age of 20, the mean duration of a single life is the tenth part of 293 years, or 29·3 years.

T t,	King William's Tontine	(Finlaison).
L l,	London Table .	(Simpson).
O o,	Norwich Table . .	(Price).
R r,	Chester Tables * .	(Price).
H h,	Holy Cross Table . .	(Price).
N n,	Northampton Table .	(Price).
A,	Amicable Society's Table.†	
C c,	Carlisle Table .	(Milne).
E,	Equitable Table . .	(A. Morgan).
G g,	Government Annuitants	(Finlaison).
P,	Chelsea Pensioners .	(Finlaison).
F,	Friendly Societies' Table	(Finlaison).

Age.	T	t:	l,	O o,	R,	r,	H h,	N n,	A:	C c:	E:	G·	g:	P:	F:	Age.
0	376	..	192	232	281	333	339	252	..	387	..	502	555	..	..	0
5	390	424	360	402	432	474	463	408	..	513	..	489	542	..	..	5
10	357*	404	348	403	419	452	460	398	..	488	483	456	511	..	..	10
15	320	373	319	375	381	414	423	365	..	450	450	418	472	..	413	15
20	293	343	289	344	349	381	387	334	366	415	417	384	440	318	376	20
25	280	317	261	316	320	348	356	309	341	379	381	359	408	311	342	25
30	263	290	236	289	293	323	327	283	311	343	345	332	376	295	309	30
35	241	263	215	261	260	293	294	257	277	310	309	302	343	279	276	35
40	217	237	196	232	229	264	264	230	244	276	274	270	311	260	246	40
45	192	206	178	203	202	235	234	205	211	245	239	238	278	237	216	45
50	169	178	160	176	176	206	204	180	179	211	204	203	244	212	187	50
55	145	155	142	149	151	175	175	156	151	176	170	172	208	186	159	55
60	116	133	124	124	124	142	149	132	125	143	139	144	173	160	133	60
65	93	102	105	101	108	119	123	109	99	118	111	116	140	132	109	65
70	72	78	88	81	81	88	100	86	78	92	87	92	110	105	86	70
75	56	56	72	64	70	71	79	65	62	70	66	71	85	..	65	75
80	49	38	50	52	54	52	58	48	50	55	48	49	65	..	48	80
85	36	38	..	35	43	48	..	34	40	41	34	31	48	..	34	85
90	20	25	..	15	25	35	..	24	29	33	26	20	28	..	24	90
95	12	16	..	..	..	..	..	8	14	35	11	12	16	..	8	95
	Tontine commenced 1693.		1728 to 1737	1740 to 1769	1772 to 1781		1751 to 1780	1735 to 1780	1740 to 1820	1779 to 1787	1760 to 1829	1780 to 1820		1813 to 1821	1823 to 1828	

Comparing tables made from the same sex, or from the mixture of both, that is, looking at T, R, A, E, and G together for the males (P and F are made from the labouring classes exclusively), at t, r, and g for females, and at L l, H h, N n, and C c for both together, the general increase of longevity is sufficiently apparent. The older tables, made from burial-registers, will not prove more than the general fact, uncorrected as they are both for increase of population and migration. The great excess of the Carlisle Table, it must be remembered, is partly owing to the deaths from small-pox having been allowed for, which, though necessary in a table intended for subsequent use among a vaccinated population, prevents the comparison between the Carlisle and preceding tables from being altogether fair. The tables A and F are very similar, and show that the life of the more provident class of labourers (who resort to Friendly Societies) is now as good as those of the Amicable Insurance Office in the last century. That Society is supposed not to have been, in former times, so careful in the selection of lives as the modern institutions of the same kind. This was probably the case, though another circumstance may have operated still more on the table. Up to the year 1808, or thereabouts, no lives older than 45 were taken; so that, while the registers of the Equitable Society have been constantly recruited with selected lives from 45 to 60, as well as at the lower ages, those of the Amicable Society have not had the same advantage above the age of 45. We think however that much of the difference between the two arises from the earlier period which the tables of the latter Society represent.

That the life of a Chelsea pensioner, who is presumed to be a worn-out soldier, should be better than that of the most provident class of labourers, may seem startling at first; but it must be observed that this is only after the age of 40; and the explanation of this circumstance hangs upon another which it is essential to notice.

Let us compare the *relative* lives of the young and old in the different tables; that is, for instance, dividing the life of a person aged 20 into 1000 parts, we ask how many such parts there are found in the life of 60. Ranging the results in order of magnitude, we find that, the life of 20 being 1000 in every table, the life of 60 is as follows:—

P: 503	t: 388	R, 355
L l, 429	H h, 385	F: 354
T: 396	G: 375	C c 345
N n, 395	r, 372	A: 342
g: 393	O o, 360	E: 333

To show that this distribution does not arise from the method of forming the tables, we have put the comma after all symbols of tables formed from burial-registers (except the Carlisle, which has been in every point too carefully corrected to allow it to rank in method of formation with the rest) and subject to errors of population, and the colon after those tables which have been formed in such a manner that no errors of the preceding kind can appear. It will then readily be seen, as a general result, that old life is relatively longest in those tables in which life in general is

* Mr. Lubbock's corrected table ('Libr. Usef. Kn., 'Probability') would have been preferable, but the mean duration is not computed.

† Formed some years ago, from the experience of the Society, which has existed since 1706. Their records however can only be said to begin from 1740.

absolutely shortest, and that tables formed from female life exclusively hold a mean rank. We have observed the same thing in many other tables, and we think a general explanation can be given. It is well known that the admirers of nature (many of them, at least) formerly included savage life in their panegyrics, and contrasted the uniform good shape and activity of many wild tribes with the frequent deformity and debility of the civilised man: this opinion however has declined since it was remarked that such uniformity of strength was probably a consequence of its being impossible for a disabled or weakened individual to subsist where the highest strength and activity are required to procure common necessaries. Something of the same sort seems to take place with regard to mortality: where the predisposing causes of death are strong and inadequately met, the weaker constitutions swell the table of mortality at the younger ages, leaving a relatively stronger class to face the chances of more advanced life. Thus in the case of a disabled soldier, he who can last to 60 is half as good, in point of duration, as he was at 20; while the insurer in the Equitable is only one-third as good relatively, and absolutely not nearly so good as the former.

It is sufficiently obvious that female life is better than male, from every comparison of the preceding tables, and almost at every age. To compare these durations, let us suppose ten individuals at every age in T and t, R and r, G and g. If we then take the united amounts of their average lives from 15 to 85, we find that, one age with another, and for equal numbers of males and females similarly distributed,

For 1000 years of male life there are in the	King William's Tontine 1104 Chester Tables . . 1112 Government Tables . 1163	Years of female life.

There appears then to have been a slight increase in the comparative goodness of female life: from which those who admit it must conclude that improved medical science and greater accessibility of comforts lengthen the life of females more than that of males. At any rate the other extreme is tolerably well proved by foreign tables, Belgian and Swedish (we have none in this country to settle the point), namely, that when the lives of women are employed in laborious occupations in the open air, they are materially shortened in duration. In Belgium the lives of women living in the country are, on the whole population in the country (mostly labourers, of course), shorter than those of men; while in the towns they are longer, the proportion above-mentioned being that of 1000 to 1071.

On the mortality of the infant periods of life there is but little information. All tables, except the Government Annuitants, unite in showing that the value of life improves up to a period which differs in different tables; being six years of age in the Northampton Table, and five in the Carlisle. With respect to the Government Table it must be observed, that the numbers in the first years of life are small, and also that all the lives are selected. If then it be more easy to select the best lives from among infants than from among grown people, the anomaly of these tables is explained; and the explanation is not difficult to admit, if we remember that the selection is made in most cases by the relations of the party selected, who are perfectly aware both of the state of health of the infant (generally more marked than that of a grown person) and the longevity of its ancestors. We consider the Carlisle Table to contain, at this time, the best information on the period of life preceding years of discretion, for the middle and higher classes.

We are also of opinion that the Carlisle Table is more likely to represent truly the very old periods of life, not from any greater quantity of materials, but from a better theory having been applied in their formation. It has been very common to end tables with the oldest lives observed in them: thus the Equitable Table ends at 97, because the latest of the deaths from which it was formed (5144 in number) took place at that age. This is not correct in principle, and is the same thing as if, a pair of dice having been thrown a large number of times (say 10,000), it should be inferred that no runs of doublets should ever be calculated on of longer duration than those observed during the course of the throws. In the case of the dice we can calculate beforehand what was the chance of longer runs; and in the table of mortality we have no *à priori* calculation, but only observation of instances: this throws a difficulty in the way, but that difficulty is not properly met by exclusion of all that has not happened as impossible. For the calculations connected with annuities, &c. it is of little consequence, because cases rarely occur in which the purchasing parties are above 80; at which age the chance of living twenty years is so small, that it would not much affect the pecuniary results if those who could get over the period between 80 and 100 years were afterwards supposed to live for ever. But for the determination of the physical laws of the duration of life, such termination of the tables at the oldest age of observed death is wholly inadmissible.

Mr. Babbage has published ('Comparative View of Institutions for the Assurance of Lives,' London, 1826; Table XII., Appendix, from Easton's *Human Longevity*, Salisbury, 1799) a table formed from 1751 persons who attained the age of 100, which we subjoin, with such additions as will make it correspond with those given before:—

Age.	No. living.	Decrement.	Yearly Rate on 1000.	Mean Duration. 100 Persons.	Age.	Age.	No. living.	Decrement.	Yearly Rate on 1000.	Mean Duration. 100 Persons	Age.
100	1751	164	94	809	100	126	71	8	113	767	126
101	1587	145	91	786	101	127	63	7	111	758	127
102	1442	162	112	762	102	128	56	6	108	746	128
103	1280	154	120	751	103	129	50	6	120	730	129
104	1126	150	133	745	104	130	44	5	114	723	130
105	976	140	143	735	105	131	39	4	102	709	131
106	836	120	144	772	106	132	35	4	115	684	132
107	716	94	131	794	107	133	31	3	100	666	133
108	622	80	129	806	108	134	28	3	107	632	134
109	542	69	127	817	109	135	25	3	120	582	135
110	473	57	120	830	110	136	22	3	136	577	136
111	416	48	115	836	111	137	19	3	158	561	137
112	368	40	108	839	112	138	16	2	115	556	138
113	328	34	104	835	113	139	14	2	143	529	139
114	294	31	106	826	114	140	12	2	167	508	140
115	263	29	110	817	115	141	10	1	100	500	141
116	234	25	107	813	116	142	9	1	111	450	142
117	209	24	115	804	117	143	8	1	125	400	143
118	185	22	112	801	118	144	7	1	143	350	144
119	163	20	123	803	119	145	6	1	166	300	145
120	143	17	119	808	120	146	5	1	200	250	146
121	126	14	111	811	121	147	4	1	250	200	147
122	112	13	116	805	122	148	3	1	333	150	148
123	99	11	111	804	123	149	2	1	500	100	149
124	88	9	102	799	124	150	1	1	1000	50	150
125	79	8	101	784	125						

This table is the necessary consequence of that very large amount of dubious testimony which exists, in various places, upon instances of particular longevity. Looked at separately, there are no means of refuting any one instance; but their united effect is beyond all credibility. The ages of many of these parties must have been ascertained by their own statements of the earliest public events within their memory, and it is not unlikely that very old persons frequently confuse what they have heard talked about in their infancy with what they have seen themselves. There is also a natural tendency to exaggerate great age. Enough however remains, when every possible allowance has been made for error, to show that the remaining life of a person aged 100 years is not so very small as it is generally believed to be; and we strongly suspect that the last 25 years of the Carlisle Table are no exaggeration, but really considerably short of the actual law which prevails among the middle classes of society.

MORTAR. Common mortar is the substance placed between the stones or bricks of a building to cement them together, and thus cause them to retain their places and give strength and stability to the edifice. Mortar is essentially composed of lime and siliceous sand, the first being in the state of hydrate or slacked lime: the sand is used of different degrees of fineness. The hardness which mortar acquires is owing to the gradual conversion of the hydrate of lime into carbonate of lime, which takes place very slowly by the absorption of carbonic acid gas from the atmosphere; in this state it adheres very firmly to the particles of silica diffused through it, and both are strongly united with the material employed in the building.

In order that this change may occur with advantage, certain conditions are requisite: if the mortar dries too quickly, the carbonate formed will remain much divided,

and will not acquire the necessary adhesive property; if, on the other hand, the mortar be placed under water, a portion of the lime will gradually dissolve, what remains will become carbonate with great difficulty, and the particles of sand will be isolated. If, on the contrary, the mortar be long kept moist and exposed to the air, the carbonic acid gas acts slowly but incessantly on the lime, the water of which becomes gradually saturated with it, and this being transferred to the lime, it is converted into an almost crystalline carbonate, in successive portions or layers, and these adhere with great force to the particles of sand. It follows, from what has been stated, that buildings erected when the weather is too hot are less stable than those which are constructed later in the year; but it is to be observed, that during frost, owing to the freezing of the water, the absorption of carbonic acid is not only stopped, but the solidity of the mortar is destroyed by the freezing or crystallization of the water.

The proportions of lime and sand employed are subject to considerable variation; those most commonly used are said to be a bushel of lime to a bushel and a half of sand; but where lime is dear, the quantity used is frequently smaller. The method of making the mortar is perfectly simple; the lime is either first slacked by the addition of water, and then the sand and more water are mixed with it, or the lime and sand are first mixed, and water is added to them in the requisite quantity.

Much has been said as to the extreme hardness of antient mortar, and it is supposed that some secret method was adopted in its preparation; but the fact may probably be accounted for by merely referring to the circumstance, that the long exposure which it has undergone in considerable masses has given it the opportunity of slowly acquiring the carbonic acid from the air, upon which its hardness and durability depend. It is to be observed that lime which is not sufficiently burnt, or lime which has been slacked by the moisture which it has acquired by exposure to the atmosphere, cannot form good mortar; the first has not been deprived of the carbonic acid which it is requisite to regain slowly from the air, and the latter has re-acquired it under circumstances which diminish instead of increase the solidity of the mortar.

When limestones contain considerable portions of silica and alumina, they form what has been termed of late years *hydraulic lime*, and the mortars made with them are called hydraulic mortars. Of these, Parker's cement is a well known kind: it will *set*, as it is termed, or become solid, in a quarter of an hour, either in the air or under water. In France artificial hydraulic lime has been prepared, and appears to answer the purpose extremely well. The limestone from which Parker's cement is made contains about 62 per cent. of carbonate of lime, 6 of carbonate of iron, 15 of silica, 5 of alumina, 6 of water, and some oxide of iron.

MORTAR, a vessel in which substances are either reduced to fragments, pulverised, or dissolved by beating or trituration with a pestle. Mortars are made of different materials and various sizes and forms, according to the use to which they are to be applied. For the purpose of breaking large masses into smaller, or for pulverising ores, metals, and coarse or heavy matters, a large cast-iron mortar with a pestle of the same material is generally preferred: it is placed upon a block, the pestle being attached to a spring, which greatly relieves the operator. Mortars made of Wedgewood or stone ware are extensively employed for pulverising, mixing, and dissolving, and they are generally used by apothecaries and chemists in preparing medicines. In some cases glass mortars are used, but this is only for solution or mixing, and not for pulverising.

For nice chemical uses, such as the reduction of substances to fine powder, an agate, flint, or porphyry mortar is used, care being taken that the mortar is of a sufficiently hard material to prevent abrasion by the substance pulverised in it.

MORTA'RA, The Province of, in the Sardinian territories, north of the Po, forms part of the great plain of Lombardy, and is bounded on the north by Novara, on the west by Vercelli, on the south by the Po, which divides it from Alessandria, and on the east by the Ticino, which separates it from the Milanese territory. The Agogna and the Terdoppio, both affluents of the Po, cross the province from north to south. The length of the province is 25 miles from east to west, and its breadth is about 22 miles from north to south. The products of the country are rice, corn, Indian corn, wine, and silk; there are also pastures for cattle. This district was formerly, and is still now occasionally, called Lomellina, from the small town of Lomello. It constituted a fief of the empire, with the title of marquisate. The towns are,—1, Mortára, with 4000 inhabitants; 2, Vigévano, the largest town in the province, near the right bank of the Ticino, which is a bishop's see, has several churches and convents, manufactories of gauze, hats, and soap, a poorhouse and workhouse opened in 1832, and 12,000 inhabitants. (Neigebaur, *Calendario Sardo*.)

MORTARS are pieces of ordnance which, compared with guns, are very short, and which are employed to throw shells or carcasses at considerable elevations (generally at 45°, but sometimes as much as 70°), in order that the missile may range to a great distance, and, by falling nearly vertically upon the object (a barrack, magazine, or casemate), may crush it by the momentum acquired in descending. Mortars are either of iron or brass; they rest upon solid beds, and the trunnions or cylinders upon which they turn, in giving the required elevation, are placed at the lower extremity of the piece. A mortar platform, in a battery, should be very strong, in order that it may bear the great recoil or shock of the piece when fired; and it should be carefully laid in a horizontal position.

The calibres of mortars in the British service are $4\frac{2}{5}$, $5\frac{1}{2}$, 8, 10, and 13 inches. All these different kinds of mortars are used on land, and the two last are also employed in the navy; but in this latter service the pieces are about 16 inches longer than the land-service pieces of the same calibre. The two first are sometimes called royal mortars.

By varying the charge of powder in the same mortar, it has been found that there is a particular elevation which, with each charge, gives a longer range than is obtained from an equal charge at any other elevation. It has also been found that the elevations which give the longest ranges differ much in two mortars of different calibres, but of like proportions, even when charged with quantities of powder bearing the same proportion to the weights of the shells.

It has been supposed that mortars were employed in the year 1495, at the siege of the castle of Naples, but on no other ground than a statement that artillery of considerable magnitude was conveyed into Italy with the army of Charles VIII. In 1588 however the use of mortars must have been well known; since, in the Appendix to the 'Colloquies of Tartaglia,' which was published in that year, the method of filling and projecting carcasses is fully described: and it appears that, in the same year, shells were thrown from ordnance at the siege of Wachtendonk. [BOMB.] Red-hot shot were thrown from mortars at the siege of Bremen, by the Swedes, in 1665.

The first artillerists were somewhat capricious in the formation of their great ordnance; and among the various kinds which they devised may be mentioned what were called Partridge mortars. These had one great central bore for the reception of a shell; and about it, on the face of the muzzle, were sunk thirteen chambers, each of which contained a grenade. The shell and grenades were discharged at the same time, and in the air they must have appeared like a flight of birds; from which circumstance, no doubt, the name of the mortar was taken.

The Dutch engineer Coehorn invented a small mortar for throwing grenades into the covered-ways of places. They were capable of being carried about and served by one man; consequently they could be readily brought up to a convenient spot, and rapidly fired when it was intended to drive the defenders from behind the parapets. In the French service *Pierriers* (small mortars loaded with stones) are still employed for the same purpose.

In the year 1771 an experiment was tried at Gibraltar on the discharge of stones from an excavation in the rock. The figure of the excavation is a parabolic conoid, whose axis is 4 feet long, and whose diameter at the muzzle is 3 feet. It was charged with 27 lbs. of powder and 1470 stones; and, on the explosion taking place, nearly one-fourth of the stones were projected to the distance of 100 yards. There are several rock-mortars, as they are called, at Malta, and such may on some occasions be useful for the defence of a pass.

MORTGAGE. A general notion of a mortgage may be collected from the following passage in Littleton (§ 332), who treats of mortgages, as then in use, under the general head of estates upon condition.

'If a feoffment be made upon such condition, that if the feoffor pay to the feoffee, at a certain day, 40*l.* of money, that then the feoffor may re-enter, &c.,—in this case the feoffee is called tenant in morgage, which is as much to say, in French, as *mortgage;* and in Latin, *mortuum vadium.* And it seemeth that the cause why it is called mortgage is, for that it is doubtful whether the feoffor will pay, at the day limited, such sum or not: and if he doth not pay, then the land, which is put in pledge upon condition for the payment of the money, is taken from him for ever, and so dead to him, upon condition, &c. And if he doth pay the money, then the pledge is dead as to the tenant,' &c.

The money thus agreed to be paid by the feoffor must be supposed to be money borrowed from the feoffee, or the amount of a debt due from the feoffor to the feoffee, though Littleton does not expressly say so. According to the terms of this contract, if the feoffor or the feoffor's heir did not pay the money at the time appointed, the land became the absolute property of the feoffee.

The mortuum vadium of Glanville (book x.) is evidently a different thing from the mortuum vadium of Littleton, and Glanville's explanation of the term seems more applicable to his mortuum vadium, than Littleton's is to the mortgage which he describes. 'When an immovable thing, says Glanville, ' is put into pledge, and seisin of it has been delivered to the creditor for a definite term, it has either been agreed between the creditor and debtor that the proceeds and rents shall in the meantime reduce the debt, or that they shall in no measure be so applied. The former agreement is just and binding; the other unjust and dishonest, and is that called a mortgage, but this is not prohibited by the king's court, although it considers such a pledge as a species of usury.' (Beames' *Transl.*)

Littleton describes the old and strict law of mortgage; but the courts of equity gradually introduced such modifications as to convert a mortgage from its antient simplicity into a very artificial and complicated arrangement. A mortgage is a contract, and therefore requires two persons at least, one of whom borrows and the other lends money. The borrower is the owner of land which he conveys or transfers as a security to the lender of the money: the borrower is called the mortgager, and the lender is called the mortgagee. The *whole* transaction is properly termed a mortgage; but the name is sometimes applied simply to the debt. The nature of this contract, as it is now understood, will best appear from a brief enumeration of the essential terms of the instrument called a mortgage deed. For the sake of simplicity, the case of a mortgage in fee may be taken as the example; and the remarks which follow must be considered as applicable to that description of mortgage.

The instrument of mortgage is a deed indented. It commences by reciting that the mortgager is the owner in fee simple of the lands which it is intended by the deed to convey to the mortgagee, and that the mortgagee has agreed to lend him a certain sum of money on the security of the lands. It is then declared that, in pursuance of the said agreement, the mortgagee has paid to the mortgager the sum of money which he (the mortgagee) has agreed to lend. The mortgager then conveys to the mortgagee and his heirs the lands in question, with a condition that if the mortgager, his heirs, executors, administrators, or assigns, shall pay to the mortgagee, his executors, &c., the sum of money borrowed, with interest for the same at the rate in the instrument mentioned, upon a future day, which is named in the deed (generally a year from the date of the mortgage deed), without any deduction or abatement whatsoever, the deed shall then cease and be void to all intents and purposes. In addition to this conveyance of the lands, the mortgager promises and undertakes to pay the principal money borrowed, and interest on the same, at the rate and at the time before mentioned in the instrument; and he also covenants (as the legal phrase is) that he has full right to convey the lands in the manner expressed in the previous part of the instrument. It is further agreed that, after the mortgager shall have failed to pay the principal sum of money, and interest, or any part thereof, as before agreed, the mortgagee, his heirs, or assigns, may take possession of the lands so conveyed as aforesaid, and use and enjoy them, and take the rents and profits, without any hindrance or interruption from the mortgager, his heirs, executors, administrators, or assigns, or any other person or persons. It is also provided that until the mortgager shall have made such default in payment as aforesaid, he, his heirs, or assigns, shall hold and enjoy and receive the rents and profits of the lands without any interruption or hindrance from the mortgagee, his heirs, or assigns. In many mortgage deeds it is also provided, that if the principal money and interest, or any part thereof, are not paid at the time agreed on, the mortgagee may sell the mortgaged lands (giving proper notice to the mortgager of such his intention, if notice is provided for by the instrument): it is also provided that after paying out of the proceeds of the sale, and out of any rents or profits which he may have received from the lands, the costs and expenses of the sale, and all other expenses incurred in the execution of the trust for sale, and retaining what is due to him for principal and interest, the mortgagee must pay the surplus, if any, to the mortgager, his heirs, executors, administrators, or assigns, or as he or they shall direct. In deeds which contain a power of sale, it is usual to insert a proviso, that such power of sale is not to destroy or prejudice the mortgagee's right of foreclosure.

These are the essential parts of a mortgage-deed, which is varied according to the estate or interest in the lands which the mortgager conveys to the mortgagee, and according to the special agreement of the parties. By the execution of the deed, the estate of the mortgager in the lands mortgaged is conditionally transferred to the mortgagee, but the mortgager's estate is not forfeited till he makes default in payment of the money borrowed and interest at the time named in the deed. The money borrowed is however seldom paid at the time agreed on, the consequence of which is that the mortgager's estate is forfeited by his not fulfilling the condition, and the mortgagee becomes the absolute legal owner of the land, or of such estate in it as was conveyed to him. He can then bring an action of ejectment against the mortgager, if the mortgager is in possession of the land, without giving him notice; and he can do this even before default in payment, unless it is agreed by the mortgage-deed that the mortgager shall remain in possession till he makes default, and a clause to this effect is commonly inserted in the deed. After the mortgage is made, the mortgager cannot make a lease of the lands without the mortgagee's consent, for he has no interest in the land out of which he can create a legal estate; and if any such lessee gets possession of the land, the mortgagee may eject him. But the lessee who claims by a title prior to the mortgage is not affected by the mortgage transaction, though, after default is made and he has notice from the mortgagee, he is bound to pay to him the future rents and those which are then due.

There has been considerable discussion as to the nature of the relation of the mortgager in possession and the mortgagee; and this relation has been supposed to be that of tenant and landlord, the nature of the tenancy varying according as we contemplate it before or after default. But this seems an erroneous view of the legal effect of the contract, and the supposition of a tenancy is perfectly useless for the explanation of the rights either of the mortgager or mortgagee, which are determined by the instrument of mortgage, and by the well-established jurisdiction of courts of equity in matters of mortgage.

From the time of default being made, the several interests of the mortgager and the mortgagee in the land must be considered as chiefly belonging to the jurisdiction of equity. When the mortgagee, by default of the mortgager, has become the absolute legal owner of the lands, the mortgager possesses what is called the equity of redemption. This equity of redemption is considered by courts of equity as an estate in the land: it may be devised by the mortgager, and, in case of his intestacy, it will descend to his heir; it may be sold, or it may be mortgaged; it is subject both to dower (in equity, by 3 and 4 W. IV., c. 105) and curtesy; and it may be settled like a legal estate.

By a recent statute (1 Vic., c. 28), made for the purpose of explaining the statute of limitations (3 & 4 W. IV., c. 27), it is enacted, That any person entitled to or claiming under any mortgage of land (as defined by the last-mentioned act) may make an entry or bring an action at law or suit in equity, to recover such land, at any time within twenty years next after the last payment of any part of the principal money or interest secured by such mortgage, although more than twenty years may have elapsed since the time at which the right to make such entry or bring such action or suit in equity shall have first accrued. This act was passed to protect the mortgagee who allows the mortgager

to continue in possession of the land or in the receipt of the rents and profits; and it secures to him his rights for twenty years after the last payment of principal or interest by the mortgager. By the 3 & 4 W. IV., c. 27, when a mortgagee has got possession of the land or receipt of the profits, the mortgagor, or the person claiming through him, can only bring a suit to redeem the lands within twenty years next after the commencement of such possession or receipt, or within twenty years from the time when the mortgagee or the person claiming through him last acknowledged in writing to the mortgager, or some person claiming his estate, or to the agent of such mortgager or person, his title of mortgager or right to redemption. The mortgager, or the person claiming under him, may therefore, at any time within the limits above-named, tender to the mortgagee his principal money and interest, and claim a reconveyance of the lands; and if the mortgagee will not accept the tender and reconvey, the mortgager may compel him by filing a bill in equity for the redemption of his lands.

A mortgagee can transfer his mortgage to another. The transfer or assignment, as it is generally called, consists of two parts expressed in one deed, the transfer of the debt, and the conveyance of the land, which is the security for the debt. If the mortgager is not a party to the assignment, the assignee takes the mortgage exactly on the terms on which the assignor held it at the time of the assignment. If therefore the mortgager should happen to have paid the whole or any part of the debt, the assignee, in coming to a settlement with him, must submit to allow such payment in diminution of the original debt which the assignor affected to assign to him.

Though the mortgagee, after the mortgager's default in payment of the principal money and interest, has the absolute legal estate, he is still considered by courts of equity only to hold it as a security for his debt. The legal estate in the land will descend to the mortgagee's heir, or will pass by his will, if duly executed; but the heir or devisee takes only the legal estate in the land, and the money or debt (as a general rule) belongs to the mortgagee's administrator or executor.

If the principal money and interest are not paid at the time agreed on, the mortgagee may file a bill of foreclosure against the mortgager. By such bill the mortgagee calls on the mortgager to redeem his estate forthwith, by payment of the principal money, interest, and costs; and if the mortgager does not do this within the time named by the decree of the court (which is generally within six months after the master in chancery has made his report of what is due for principal, interest, and costs), he is for ever foreclosed and barred of his equity of redemption, and the mortgagee becomes the owner of the land in equity, as he was before at law. If the money is paid at the time named, the mortgagee must reconvey the land, and deliver up to the mortgager all the deeds and writings in his possession relating to the land.

If both the mortgager and mortgagee are living at the time when the lands are redeemed, and nothing has been done by either party to assign or transfer his interest to any other person, the transaction is a very simple one: the mortgager pays his debt and interest, and the mortgagee reconveys the lands. The settlement of accounts between the mortgager and mortgagee may be rendered more difficult by the circumstance of the mortgagee having received the rents, for which the decree for redemption provides that he must account. It may however happen that the mortgager or mortgagee is dead, or that they have severally disposed of their interests in the lands, or all these events may have happened, which renders the settlement much more complicated.

To take the case of mortgager and mortgagee being dead. As every mortgage transaction implies a debt from the mortgager to the mortgagee, which he is bound to pay, even if there are no covenants for payment in the mortgage-deed, it follows that, according to the general rule of law, his personal estate is in the first instance liable to pay the mortgage debt, unless he has by his will made a different provision for payment of it. Thus the heir or devisee of the equity of redemption may be entitled to call on the administrator or executor to pay the mortgage debt. If however the lands in question were not mortgaged by the intestate or devisor, but the equity of redemption descended or was devised to him from or by the mortgager, or if he purchased the equity of redemption, his personal estate is not liable to pay the mortgage debt; but the person who derives his title to the land from such intestate, devisor, or purchaser, must take it subject to the burden of the mortgage debt.

When a mortgage deed contains a power of sale, which is exercised in the lifetime of the mortgager, the surplus money is personal estate; but if the sale is effected after the mortgager's death, the money belongs to his heir or the devisee of the lands.

The person entitled to receive the debt is the administrator or executor of the mortgagee; for, as already observed, the land is only considered as a security for the debt, which the mortgager has bound himself, his heirs, executors, and administrators, to pay to the mortgagee, his executors, administrators, and assigns. Thus whether the mortgagee dies without having or after having assigned his mortgage, the money is a debt due to the personal representative of the mortgagee, or to his assignee, or to the personal representative of the assignee, if the assignee is dead. When the debt is received by the person entitled to receive it, the person who has the legal ownership of the land, whether he be heir or devisee, is bound to convey it to the person who, on the payment of the debt, becomes entitled to the legal estate. In such case, on payment of the debt to the person entitled to receive it, the heir or devisee is by a fiction converted into a trustee for the person entitled to the land. The mortgagee may however, by express declaration, convert the mortgage debt into land (according to the technical expression), and make it pass as land by his will; in which case the devisee will have the same title to the money as he would have had to the land if it had been absolutely the property of the mortgagee.

When the mortgager has mortgaged his equity of redemption (which he may do as often as he pleases), every new mortgagee has his claim on the land as a security for his debt, according to the order in which his mortgage stands. This is the general rule; but it is subject to various exceptions, which depend on particular circumstances. Thus a mortgagee of the equity of redemption will be postponed, as to his security, to a subsequent mortgagee who has advanced his money without notice of the prior mortgage, if such subsequent mortgagee should be able to obtain the legal estate.

If a second mortgagee obtains the title-deeds of the estate, this will not give him a preference over a prior legal mortgagee, unless the prior mortgagee has parted with or failed to get possession of the title-deeds for fraudulent purposes, or through gross negligence. But though the second mortgagee has no priority, when there is neither fraud nor negligence, he will not be compelled to give up the title-deeds to the first mortgagee, unless the first mortgagee pays him his debt and interest.

A legal mortgage is effected by an instrument which transfers the legal estate. When a mortgager makes a second mortgage, and uses the form of a legal conveyance, this also is called a legal mortgage, though there is no transfer of any legal estate, for the legal estate is already conveyed to another person. This kind of mortgage may be called a mortgage of an equity of redemption, by way of distinguishing it from the equitable mortgage next mentioned. An agreement in writing to transfer an estate as a security for the repayment of a sum of money, is called an equitable mortgage, because it gives the intended mortgagee a right to have a legal mortgage, and in a court of equity gives him in fact all the rights of a legal mortgagee. A deposit of the title-deeds of an estate, or of the copy of court roll, as a security for a debt contracted at the time of the deposit, or previously to the deposit, constitutes an equitable mortgage. An equitable mortgagee by deposit of title-deeds, has a preference over a subsequent purchaser or mortgagee who obtainsthe legal estate with notice of the equitable mortgage.

If the mortgager is not seised in fee, but has only a limited interest in land, as a lease for years, the mortgager, by taking an assignment of the lease, becomes liable for the rent, and to the covenants contained in the lease, though he has never taken possession of the premises included in it. The same rule was for a time held to apply to an equitable mortgagee by deposit of title-deeds [Lease]; but in a very recent case it has been decided that the equitable mortgagee is not liable to such covenants (*Moore* v. *Choat*, 8 Sim., 508; and so the matter stands at present.

The preceding remarks apply to mortgages of land only, in which there are many peculiarities which arise from the condition of legal ownership of land in this country. But other kinds of property may be mortgaged, such as chattels personal, a life-interest in a sum of money, or a policy of insurance, or a ship, or shares in a ship. The subject of pawning or pledging of goods is treated under PLEDGE, and also the rules of the Roman law as to Hypotheca and Pignus. The equitable lien on land, which is classed among mortgages by some writers, is briefly noticed under LIEN; and mortgages of ships under SHIP.

No attempt has here been made to lay down all or the greater part of the rules applicable to mortgages. The explanation of these rules would fill a large volume. The general principles of all mortgages are however here laid down, and the reader must consult professional books for particular cases.

MORTIFICATION (in Medicine) is the death of any tissue. It may occur from a variety of causes, as intense inflammation [INFLAMMATION], or from anything which is followed by a cessation of the circulation of blood through a part, as diseases of the arteries and veins, the pressure of tumours and foreign bodies, excessive debility, &c., or from any sudden and violent chemical or mechanical agent, as strong acids or other corrosive substances, excessive heat or cold, violent blows, &c. The process of reparation consists in the separation of the living tissues from the dead, the removal of the latter by absorption or by being thrown off externally, and the granulation and cicatrization of the exposed surface of the former.

MORTIFICATION. [MORTMAIN.]

MORTIMER, JOHN HAMILTON, an artist of great talent and of high repute in his day, was born in 1741, and was the son of a miller who afterwards became a collector of the customs at Eastbourne. John was the youngest of four children, and having discovered a taste for drawing, which he is supposed to have acquired from an uncle who was an itinerant portrait-painter, he was, at about the age of eighteen or nineteen, placed under Hudson, who had been the instructor of Reynolds. With him however he did not continue long, but, after having studied awhile in the gallery of the Duke of Richmond, began to make himself known by his productions. One of his earliest works, founded on an incident in the life of Edward the Confessor, painted in competition with Romney, obtained from the Society for the Encouragement of Arts a premium of fifty guineas, and that of St. Paul preaching to the Britons one hundred guineas. He was further distinguished by the notice and friendship of Reynolds, which friendship has been attributed not to the sympathy but to the opposition of their tastes in art. Certainly there was little room for jealousy or rivalry between them: Mortimer was no colourist, and but an indifferent portrait painter, although he produced many admirable heads and likenesses in black and white chalk. His talent lay in design, and in wild and fantastic quite as much as in historical subjects. His groups of banditti are masterly; and his 'King John signing Magna Charta,' 'The Battle of Agincourt,' &c., show him to have possessed great and original powers in the higher walk of art; and in his knowledge of the human figure he has rarely been surpassed. The 'Brazen Serpent in the Wilderness,' in the great window of Salisbury cathedral, and the cartoons for that in Brazenose College, Oxford, were designed by him.

In person Mortimer was handsome, his figure of athletic mould, and his constitution was naturally very strong, but he greatly impaired it by the excesses of what is called free living. About the year 1775 his health began to decline, his former exuberant gaiety abandoned him, and he became altogether an altered man; but though he in some degree recovered, and was able to employ his pencil both industriously and profitably, realising by it nine hundred pounds in the course of a single year, his life was soon cut short, for he died on the 4th of February, 1779, in the thirty-eighth year of his age. He was buried in the church at High Wycombe, near the altar; where is his painting of 'St. Paul preaching to the Britons.'

MORTMAIN. By the 9 H. III., c. 36 (Magna Charta), it was declared that it should not be lawful for the future for any person to give his land to a religious house, so as to take it back again and hold it of the house; and any such gift to a religious house was declared to be void, and the land was forfeited to the lord of the fee. The reason of this provision is obvious, if we consider the nature of the feudal tenure; and indeed it is distinctly expressed in the preamble of the statute of the 7 Edward I., sometimes entitled 'De Religiosis,' as follows: 'Whereas of late it was provided that religious men should not enter into the fees of any without the licence and consent of the chief lords (capitalium dominorum) of whom such fees are immediately held; and whereas religious men have entered as well into fees of their own as those of others, by appropriating them to their own use and buying them, and sometimes receiving them of the gifts of others, by which means the services due from such fees, and which were originally provided for the defence of the realm, are unduly withdrawn, and the chief lords lose their escheats of the same,' &c. The statute then forbids any religious person or any other to buy or sell lands or tenements, or under colour of a gift or term of years, or any other title whatever, presume to receive from any one, or by any other means, art, or contrivance, to appropriate to himself lands or tenements, so that such lands and tenements come into mortmain in any way (ad manum mortuam deveniant), under pain and forfeiture of the same. The statute then provides, that if it is violated, the lord of whom the lands are holden may enter within a year; or if he neglect to enter, the next lord may enter within half a year; and if all the chief lords of such fees, being of full age, within the four seas, and out of prison, neglect to enter, the king may enter.

The general notion of mortmain may be collected from the words of this statute, the term being used to express lands belonging to any corporate body, ecclesiastical or temporal, sole or aggregate. Various explanations have been offered as to the reason why lands of this description were said to be in mortmain, or in mortua manu, that is, in a dead hand. Under the feudal system lands held by any corporate body or person might not inappropriately be said to be in a dead hand as to the lord of the fee, for as a corporation has perpetual continuance and succession, the lord lost the profits in his lands which, under the strict system of tenures, he derived either from the services of the tenant, while alive, or from the death of the tenant and other circumstances incident to such event. Accordingly the best explanation of the meaning of this term seems to be that offered by Coke, that 'the lands were said to come to dead hands as to the lords, for that by alienation in mortmain they lost wholly their escheats, and in effect their knights' services for the defence of the realm, wards, marriages, reliefs, and the like, and therefore was called a dead hand, for that a dead hand yieldeth no service.' Similarly, the old mortuum vadium seems to have been so called, because the land in pledge was for the time dead to the pledger. [MORTGAGE.]

Before the 9th Hen. III., c. 36, was passed, a man might give or sell his lands to religious as well as any other persons, unless it was forbidden in the gift of the lands to himself; and accordingly the great lords, on making a grant of land, used to insert a clause preventing the sale or gift to religious and also to Jews: Licitum sit donatorio rem datam dare vel vendere cui voluerit, exceptis viris religiosis et Judeis. (Bracton, fol. 13.)*

This statute of Edward I. prevented gifts and alienations between corporate bodies or persons and others, but it was eluded by a new device, apparently invented by the clergy, and probably most used by the religious houses. These bodies, pretending a title to the land which they wished to acquire, brought an action for it by a Præcipe quod reddat against the tenant, who collusively made default, upon which the religious house had judgment, and entered on the land.

The statute of the 13 Edward I. (Westminster, 2), c. 32, provided against these recoveries of lands obtained by collusion; for it was enacted, that after the default made, it should be inquired whether the demandant had any right in his demand or not; and if the demandant were found to have no right, the land was declared to be forfeited to the lords mediate and immediate, similarly as was provided by the previous statute of Edward I. Another provision of this statute (c. 33) furnishes curious evidence as to the devices practised for the purpose of eluding the statutes of mortmain. The words of the enactment will best explain the allusion:—'Forasmuch as many tenants set up crosses or permit them to be set up on their tenements, to the preju-

* Viner (art. 'Mortmain'), quoting Coke, who writes this passage 'Licitum sit *donatori*,' says, 'Quære if it should not be *donato*, donee.' Such a blunder might have been avoided by looking at the original, or might have been corrected even without doing so.

dice of their lords, in order that the tenants may defend themselves by the privileges of Templars and Hospitallers against the chief lords of the fees, it is enacted, that such tenements be forfeited to the chief lords, or to the king, in the same way in which it is enacted elsewhere with respect to tenements alienated in mortmain' (de tenementis alienatis ad mortuam manum).

Various other statutes were passed in the reigns of Edward I. and Edward III. relating to mortmain; but the next important statute is that of the 15 Richard II., c. 5. As corporations could not now acquire lands by purchase, gift, lease, or recovery, they had contrived another new device, said to be mainly the invention of or mainly practised by ecclesiastical bodies or persons. The device consisted in this: the lands in question were conveyed to some person and his heirs to the use of the ecclesiastical body or person and their or his successors. In this way the legal estate was not in the possession of those who could not legally hold it, but in a person who had such legal capacity; and the use or profit of the land, the beneficial interest in it, was secured to the ecclesiastical body or person, contrary to the spirit of the previous statutes, though not contrary to their expressed provisions. The statute of Richard, after declaring that this use was also mortmain, further declared all such conveyances to be void, and that the lords might enter on lands so conveyed, in the manner provided for by the statute De Religiosis. This distinction of the ownership of land into the legal and beneficial was undoubtedly derived by the clergy from the like distinction in the Roman law between Quiritarian and Bonitarian ownership, which is briefly and distinctly expressed by Gaius (ii. 40).

Though the statute De Religiosis was in its terms comprehensive enough to include all alienations to corporate bodies or persons, it is clear that this statute was mainly directed against the clergy, both regular and secular. The ecclesiastical corporations were more numerous than any other, and had been more active in getting lands into their hands. This statute of Richard II. however expressly extends the statute De Religiosis to lands purchased to the use of gilds or fraternities; from which it has been inferred that the doctrine of mortmain had not, before the date of this statute, applied to gilds or fraternities. The statute De Religiosis is by this statute of Richard II. expressly declared to apply also to what we now call municipal corporations, and the statute places such bodies in all respects on the same footing, as to the purchase of lands, with 'people of religion.' If such bodies as these had been considered within the statute De Religiosis, it seems clear from the statute of Richard II. that their acquisitions of land had only recently become of such magnitude as to make it seem expedient to make a special declaration by statute as to them.

A statute of Henry VIII. (23 Henry VIII., c. 10), commonly called an act against superstitious uses, is perhaps hardly a statute against mortmain in the strict sense of the term. The statute enacted that feoffments, fines, recoveries, and other estates, made of lands and hereditaments to the use of parish churches, chapels, gilds, fraternities, commonalties, &c., erected and made of devotion or by common consent of the people without any corporation, or to uses for perpetual obits, or a continual service of a priest, were declared to be void as to such gifts as were made after the first of March in the year in which the statute was passed, for any term exceeding twenty years from the creation of such uses. From the words 'by common consent of the people, without any corporation,' it can hardly be inferred that a number of individuals could take in perpetual succession without being incorporated, as some writers suppose; for 'to take by perpetual succession without being incorporated' involves a contradiction. Nor can the statute be construed as admitting by implication such a power of perpetual succession in unincorporated individuals. The statute destroys all such estates and interests in land as in any way or by any persons were held to the use of the establishments or collections of individuals mentioned and described in the statute.

The subsequent statutes passed in the reign of Henry VIII. (27 H. VIII., c. 28; 31 H. VIII., c. 13; 37 H. VIII., c. 4), together with the statute passed in the first year of Edward VI. (1 Edw. VI., c. 14), put an end to religious houses and many other establishments which had been the special objects of the statutes of mortmain and superstitious uses. The consideration of what are now legally called superstitious uses properly comes under the head of USES, SUPERSTITIOUS AND CHARITABLE.

The king could always grant a licence to alien in mortmain, or, more correctly speaking, he could remit the forfeiture consequent upon alienation, so far at least as concerned himself; but such remission could strictly only affect his own rights, and not those of the mesne lords, unless they also consented. It was the practice, before the king granted his licence, to sue out a writ of *ad quod damnum*, in order that inquiry might be made and the king informed what damage himself or others might sustain from the licence. This practice however fell into disuse long before the statute of the 7 & 8 Will. III., c. 37, which authorises the king to grant to any person or persons, corporate or not, licence to alien in mortmain, and to purchase and hold in mortmain any lands or hereditaments, and that such lands shall not be subject to forfeiture. When a licence to hold lands in mortmain is granted, it generally specifies the amount in value of the lands to be held by the corporation to which it is granted; and if the corporation should be ever found to acquire lands beyond this value, such lands are forfeited to the lord.

Until the statute of 9 Geo. II., c. 36, presently mentioned, though lands could not be aliened in mortmain, yet certain gifts to corporate bodies were held good. Thus, if a feoffment was made to a dean and chapter to perform a charitable use (within the 43 Eliz., c. 4), it was good, though they could not be seised to another's use; and a devise to a college to a charitable use within this statute was also good. (Hob., 136; 1 Lev., 284.)

The statute of the 9 Geo. II., c. 36, is now commonly, though not correctly, called the Statute of Mortmain. It applies only to England and Wales. It is entitled 'An Act to restrain the Disposition of Lands, whereby the same become inalienable.' The provisions and object of this enactment cannot be otherwise expressed than by stating the first section at full length:—'Whereas gifts or alienations of lands, tenements, or hereditaments, in mortmain, are prohibited or restrained by Magna Charta and divers other wholesome laws, as prejudicial to and against the common utility; nevertheless this public mischief has of late greatly increased by many large and improvident alienations or dispositions made by languishing or dying persons, or by other persons, to uses called charitable uses, to take place after their death, to the disherison of their lawful heirs: for remedy whereof be it enacted, that from and after the 24th day of June, 1736, no manors, lands, tenements, rents, advowsons, or other hereditaments, corporeal or incorporeal whatsoever, nor any sum or sums of money, goods, chattels, stocks in the public funds, securities for money, or any other personal estate whatsoever, to be laid out or disposed of in the purchase of any lands, tenements, or hereditaments, shall be given, granted, aliened, limited, released, transferred, assigned, or appointed, or any ways conveyed or settled to or upon any person or persons, bodies politic or corporate, or otherwise for any estate or interest whatsoever, or any ways charged or encumbered by any person or persons whatsoever, in trust or for the benefit of any charitable uses whatsoever, unless such gift, conveyance, appointment, or settlement of any such lands, tenements, or hereditaments, sum or sums of money, or personal estate (other than stocks in the public funds), be made by deed indented, sealed, and delivered, in the presence of two or more credible witnesses, twelve calendar months at least before the death of such donor or grantor (including the days of execution and death), and be enrolled in His Majesty's High Court of Chancery within six calendar months after the execution thereof; and unless such stocks be transferred in the public books usually kept for the transfer of stocks, six calendar months at least before the death of such donor or grantor (including the days of the transfer and death); and unless the same be made to take effect in possession for the charitable use intended immediately from the making thereof, and be without any power of revocation, reservation, trust, condition, limitation, clause, or agreement whatsoever, for the benefit of the donor or grantor, or of any person or persons claiming under him.' The act provides that what relates to the time before the grantor's death for sealing the deed and making the transfer shall not extend to any purchase to be made really and bonâ fide for a full and valuable consideration, actually paid at or before the making of such conveyance or transfer without fraud or

collusion. The two universities of Oxford and Cambridge, and the colleges within them, were excepted from the operation of the act; and the colleges of Eton, Winchester, and Westminster, but in favour of the scholars only, were also excepted. This act limited the number of advowsons which any college or house of learning (before referred to in the act) could hold; but this restriction was removed by the 45 Geo. III., c. 101. By the 5 Geo. IV., c. 39, the British Museum is excepted from the statutes of mortmain; and various other public bodies have been in like manner excepted by act of parliament. The judicial interpretation of this act, called the Mortmain Act, has prevented a large amount of property from being given to charitable uses. A bequest of money for charitable purposes, to arise from the sale of land, is void; or of money due on mortgages; or of money to pay off the mortgage on a chapel; or of money to build a chapel, unless some land already in mortmain is distinctly pointed out by the terms of the bequest; or of mortgages both in fee and for years; or of money to be laid out on mortgage security. This act can only be called a Mortmain Act with any propriety so far as it relates to corporate bodies, and even with regard to them with no strict propriety, inasmuch as the Mortmain Acts were intended to prevent corporate bodies holding lands to their own use, or to prevent other persons holding them to the use of corporate bodies. The act is in fact intended to limit the power of giving property for charitable purposes to any person or persons, and is very improperly called a Mortmain Act, if we consider that many gifts of land for charitable purposes were not considered, before the passing of this act, as within the old statutes of mortmain.

The history of mortmain is intimately connected with the ecclesiastical and civil history of this country. The jealousy which all mankind feel against rich and powerful bodies of men, who are combined in a perpetual brotherhood and fraternity, and the constantly increasing wealth and power of the ecclesiastical bodies in this country, doubtless contributed strongly to the passing of the enactments called the statutes of mortmain; and this, independently of the solid reasons against such bodies having large possessions, so long as the strict system of tenures continued. In modern times, when the lord can lose nothing by land being conveyed to a corporation or to a charitable use, except the remote contingency of escheat, a new notion lies at the foundation of the restraints upon such transfers or gifts of land, which, as Lord Hardwicke expressed it, was this:—

'The mischief which the legislature had in view in the Mortmain Act (as appears from the recital, and which is agreeable to the title) was to restrain the disposition of lands whereby they become inalienable.' In another place he observes that 'the particular views of the legislature were two: first, to prevent locking up land and real property from being aliened, which is made the title of the act; the second, to prevent persons, in their last moments, from being imposed on to give away their real estates from their families.'

It will be perceived that the provisions of the act very imperfectly correspond with this explanation of its object. Thus money may be given by will (if unaccompanied with a direction to lay it out in land) to an eleemosynary corporation which is empowered to hold land in mortmain, and it may be laid out in land, or, if necessary, a licence may be obtained from the crown for that purpose. The judicial exposition, that money given by will, to arise from the sale of lands, is within the act, involves a direct contradiction; it being expressly provided by the mode of donation, in the case just mentioned, that the land shall *not*, so far as the donor can prevent it, come into hands in which it will be inalienable.

The act, which is but a clumsy contrivance, and the exposition of it, are in fact directed against gifts for charitable uses; though it is probable that the notion of the impolicy of allowing lands to be for ever set apart, or 'locked up,' had also some influence on the legislature. If this however had been the leading idea, a repeal of the statute which allows the crown to grant a licence to hold lands in mortmain would have been a proper addition to the act. But the legislature or the promoters of the act were apparently anxious to find out some reason or excuse for passing such an act in a country where gifts for charitable uses have been so long established and approved by popular opinion. The exceptions made in this act in favour of the universities and colleges also show that there was a party in the legislature strong enough to prevent the operation of this act being extended to those corporate bodies.

It should be borne in mind that the terms charities and charitable uses have a legal meaning very different from the popular meaning of the term charity.

The great amount of property in England and Wales which is appropriated to charitable uses, and the importance of many of those establishments which are supported by such property, render it necessary to give some exposition of the nature and administration of charities in this country, which is most conveniently done under the head of USES, CHARITABLE.

The term *Mortification* in Scotland expresses pretty nearly what mortmain does in England.

According to Stair (book ii., tit. iii., 39, ed. Brodie), 'infeftments of mortified lands are those which are granted to the kirk or other incorporation having no other *reddendo* than prayer and supplications and the like: such were the mortifications of the kirk lands granted by the king to kirkmen, or granted by other private men to the provost and prebendars of college kirks founded for singing; or to chaplainries, preceptories, altarages, in which the patronage remained in the mortifiers.' The act of 1587, c. 29, passed in the eleventh parliament of James VI., began by reciting that the king 'and his three estaites of parliament perfitely understood the greatest part of his proper rent to have bene given and disponed of auld to Abbaies, Monasteries, and utheris persons of Clergie,' &c.: it further recited that 'his Hienes, for the great love and favour quhilk he bearis to his subjectes, was nawaies minded to greeve them with unprofitable taxations, specially for his royal support.' The act then went on to declare that it was 'founde maist meete and expedient that he sall have recourse to his awin patrimonie disponed of before (the cause of the disposition now ceasing) as ane helpe maist honorable in respect of himselfe and least grievous to his people and subjectes.' The act then proceeded to unite and annex to the crown (with the exceptions after specified in the act) all the lands, &c., belonging to the ecclesiastical and religious personages therein mentioned. This act was in effect more extensive than the similar acts of Henry VIII. in England.

Since the Reformation, lands given in Scotland for charitable purposes are given to the trustees of the charity, to be held either in blanch or feu holding. (Bell's *Dict. of the Law of Scotland.*)

MORTON, JAMES DOUGLAS, Fourth EARL OF, and Regent of Scotland, was a younger son of the great family of Angus, which, besides other honours, had more than once held the office of lord-high-chancellor of Scotland, and by the marriage of the sixth earl of Angus with Margaret of England (widow of King James IV.) had recently been brought into intimate connection with Henry VIII., the brother of that princess. Morton was nephew to the above earl, being second son of the earl's younger brother, Sir George Douglas of Pittendreich. These two brothers had mutually assisted each other in their struggle for power during the minority of King James V.; and on the earl's fall in 1528, Sir George fled and remained an exile during the remainder of James's reign. He then returned to his native country, and in 1543 was appointed a privy-counsellor to the Regent Arran.

Previous to this period, but at what precise time is uncertain, the younger son of Sir George had married Lady Elizabeth Douglas, daughter of the third earl of Morton, by a natural daughter of King James V.; and on that occasion the earl, having no male issue, obtained a new reversionary clause to his patent, transferring the earldom to this fortunate son-in-law. In consequence of this provision he was styled the Master of Morton; and on his father-in-law's death, in 1553, he became earl of Morton. Up to this time he followed undoubtedly the footsteps of his father, who was an active promoter of the Reformation, and a friend of King Henry VIII. in the designs of that monarch in reference to Scotland. His name however does not often appear in the public transactions of the period; and although one of the original lords of the congregation in 1557, yet afraid perhaps of the consequences, in a personal point of view, of casting off the queen regent, from whom he had already received considerable favours, he long held a doubtful and irresolute course. It was this which made Sadler, the English envoy, describe Morton as 'a simple and fearful man.' From the time of the queen regent's death however that description was inapplicable to him; and on the 7th January, 1563, he was constituted lord-high-chancellor of the kingdom, in the room of the forfeited Earl of Huntly, who

had been the great head of the Catholic party in Scotland. He had been only a few years in that office however when he was obliged to lay it down, and fly into England, on occasion of Rizzio's murder, in which cruel and lawless affair he took an active and prominent part. He remained in England, under the protection of the English monarch, till the end of the year, when he was restored to Mary's favour by the intercession of Bothwell, whose ambitious designs needed all the aid which could be drawn together from every quarter. Bothwell soon opened to him the plot which he meditated for the murder of Darnley, expecting, no doubt, his ready acquiescence. In this however Bothwell was mistaken; Morton refused to concur. But neither did he inform Darnley of the plot, nor take any measures to prevent its being executed; and he was one of those who subscribed the famous bond, to protect Bothwell against the charge of being concerned in the murder, and to use every endeavour to promote his marriage with the queen. Yet when this latter event took place, and when Bothwell became odious to the nation, Morton was the great leader in opposition to him; and it was to the castle of his relative, the lady of Lochleven, that Mary was conducted when she delivered herself up at Carbery Hill. When Mary was securely lodged in this place of confinement, the earl of Murray was made regent of the kingdom, and Morton reinstated in the office of lord chancellor. He continued in this situation during the regencies of Murray, Lennox, and Mar, and was indeed a principal actor in all matters of importance which took place in their time; and on Mar's death at the end of the year 1572, Morton was himself appointed regent of the kingdom. Here his ability and vigour indeed, but at the same time his ambition, his avarice, and rapacity, and his general want of principle, became apparent to all; he was now at once feared and hated; and finding himself becoming odious to the nation, he conceived the idea of retrieving his reputation by resigning, or rather offering to resign, the government into the king's (James VI.) own hands, his majesty being now in his twelfth year. Accordingly on the 12th September, 1577, he made resignation of his office, and the king, by the advice of Athol and Argyl, accepted it, to the great joy of the people. Morton, thus unexpectedly taken at his word, retired in a sort of pet to Lochleven, which, from his formidable character, was then commonly called the *Lion's Den*; and from this retreat he watched a favourable moment to regain his power. An opportunity presented itself, and he immediately became master both of Stirling Castle and of the king's person. He then resumed power, and by the help of Queen Elizabeth retained it for some time, but at length the king's new favourite, Captain Stewart, who, as Robertson says, shunned no action however desperate, if it led to power or favour, charged him, in the king's presence, with being accessory to the murder of Darnley. Upon this charge Morton was committed first to his own house, then to the castle of Edinburgh, (2nd January, 1581), and then to Dumbarton, of which Lennox, the father of Darnley, had the command. Elizabeth used every endeavour in favour of Morton, but the greater the solicitude which she showed for his safety, the more eagerly did his enemies urge his destruction; and being carried by Captain Stewart, then earl of Arran, into Edinburgh, he was, on the 1st of June, 1581, brought to trial, found guilty, and condemned. When that part of the verdict was read which, besides finding that he had concealed, found that he was also accessory to the murder, he repeated the words with vehemence, and then exclaimed, 'God knows it is not so.' The next morning, speaking of the crime for which he was condemned, he admitted that on his return from England, after the death of Rizzio, Bothwell had informed him of the conspiracy against Darnley, which the queen, as he told him, knew of and approved, but that he had no hand in it. And as to revealing the plot, 'To whom,' said he, 'could I reveal it? To the queen? She was aware of it. To Darnley? He was such a babe, that there was nothing told to him but he would tell to her again; and the two most powerful noblemen in the kingdom, Bothwell and Huntly, were the perpetrators. I foreknew and concealed the plot, but as to being art and part in its execution, I call God to witness, I am wholly innocent.' When his keepers told him that the guards were attending, and all was in readiness, he replied, 'I thank my God, I am ready likewise.' On the scaffold his behaviour was calm, his countenance and voice unaltered, and after some time spent in acts of devotion, he was beheaded by the instrument called the Maiden, on the 3rd June, 1581. His head was placed on the public gaol; and his body, after lying till sunset on the scaffold, covered with a beggarly cloak, was carried by common porters to the usual burial-place of criminals. None of his friends accompanied it to the grave—they did not venture to discover their gratitude or respect by any expressions of sorrow. Public opinion was unanimous in his condemnation.

MORTON, JOHN, cardinal and archbishop of Canterbury, was the eldest son of Richard Morton, of Milbourne St. Andrew's, in Dorsetshire, and was born at Bere in that county, in 1410. He received his earliest education at the abbey of Cerne, whence he removed to Baliol College, Oxford. Of his progress in that university we know but little, till he became principal of Peckwater Inn. His practice as an advocate in the Court of Arches subsequently recommended him to the notice of Cardinal Bourchier. The cardinal, beside conferring upon him various preferments, introduced him to King Henry VI., who made him one of his privy-counsel. He adhered to this unfortunate prince with so much fidelity, that even his successor Edward IV. could not but admire his attachment, which he rewarded by taking Morton into his councils. In 1473 Morton was appointed master of the rolls; and between this time and 1477 the list of his promotions to prebendal stalls and other preferments in different quarters of the kingdom proves the high esteem in which he was held. In 1478 Edward IV. made him bishop of Ely and lord chancellor of England, and at his death appointed him one of his executors. He was viewed in no favourable light by Richard III., who, at the same time that Lord Stanley was arrested, gave Morton in ward to the duke of Buckingham. He escaped however from the duke's castle at Brecknock, and concealed himself for a time in the Isle of Ely; soon after which, passing in disguise to the Continent, he joined the earl of Richmond, and is said to have been the person who first proposed the coalition of the two houses of York and Lancaster by the marriage with the eldest daughter of Edward IV. As soon as Henry VII. was seated on the throne, he also made Morton one of his privy-counsel, and on the death of Cardinal Bourchier, in 1486, joined with the pope in promoting him to the archbishopric of Canterbury. In August, 1487, if not earlier, he was again constituted lord chancellor, and in 1493 created a cardinal by pope Alexander VI. He died September 15th, 1500. Morton was a man of great talents, learning, and probity. The cut or drain from Peterborough to Wisbeche, known by the name of Morton's Leame, was made entirely at his expense while he was bishop of Ely; and the opinion seems well founded that the English Life of Richard III., usually attributed to Sir Thomas More, was really written by Morton. (Tanner, *Bibl. Brit. Hib.*, pp. 532, 533; Bentham's *Hist. of Ely*, 4to., Cambr., 1771, p. 179-181; Chalmers's *Biog. Dict.*)

MORTUARY, from the Latin *mortuarium*, by our Saxon ancestors called ſaul-ſceat, soul-shot, or money paid at death. The mortuary was really a gift left by a man to his parish church, as a recompense for his personal tithes and offerings not duly paid. Dugdale, in his 'History of Warwickshire,' p. 679, enters minutely into the reason and original occasion of such bequests, the earliest mention of which he finds in the 'Council of Ænsham,' in the year 1009, and in the 'Laws of King Canute.' Mortuaries were afterwards distinguished into dead mortuaries, and *mortuaria viva*, or live mortuaries: the former consisting of money, or any other goods or chattels; the latter of live-stock: Blount says the second-best beast, after the first had been paid to the lord for his heriot. After the Conquest we find the mortuary sometimes called a *cors-present*, because the beast was presented with the body at the funeral. John Arden, in his will dated 4th of June, 17th Hen. VIII., says, 'Item, I bequeath for my mortuary, or cors-presentè, a black gelding ambling, that Almighty God may the rather take my soul unto his mercy and grace.' Dugdale quotes several antient wills from the time of Hen. III. to that of Hen. V., in which horses, caparisoned and bearing the military weapons of the defunct, are directed to be led before the corpse at his funeral, and delivered as mortuaries. This was the origin of the practice of leading horses at the funerals of persons of distinction. Mortuaries, in time, were found oppressive to the yeomanry and poorer inhabitants of parishes: they were regulated, and converted into a money payment by stat. 21 Hen. VIII., chap. 6, A.D. 1530. Kennett, in the Glossary to his 'Parochial Antiquities,' says

that a mortuary was sometimes paid to the lord of a fee, as well as to the priest of the parish.

(Selden, *Hist. of Tythes*, p. 287; Dugd., *Hist. Warw.*, ut supr.; Jacob's *Law Dict.*; Manning and Bray's *Hist. of Surrey*, i., pp. 386, 388; Kennett's *Paroch. Antiq.*, i., p. 101, and *Glossar.*)

MORVEAU. [GUYTON DE MORVEAU.]

MORUS ALBA, or the White Mulberry, is a native of China, where it forms a small tree, and whence it has been gradually carried westward, till it has become a common plant in most of the temperate parts of the Old World, forming in the south of Europe a pollard-tree by road sides. Its leaves are smooth and shining, usually heart-shaped at the base, and on old trees ovate or oblong, but on young vigorous shoots as frequently divided into deep lobes. The fruit is white, insipid, and of little value, except for feeding poultry; in this country it is seldom formed. It is on this species that the silkworm is chiefly fed; and in silk countries many varieties are cultivated for the purpose, some of which are said to be much better than others. The common wild kind is said to suit the silkworm as well as or even better than any other kind; but as it yields only a small quantity of foliage, compared with other sorts, it is principally employed as the source of seeds from which stocks are raised for grafting more productive varieties. Of the latter each silk country has its own fancy kinds, which there would be little advantage in noticing here; but there is among them an exception of importance, the value of which has been recognised wherever it has been cultivated. Some years since a mulberry was introduced into France from Manilla, whence it has gained the name of the Philippine Mulberry, the great excellence of which seems universally acknowledged. It has straight smooth branches, oval heart-shaped leaves tapering to a point, thin, rather soft, a little blistered and puckered in the middle, often drooping, and sometimes more than six or even nine inches broad in the dry climate of the south of France. It grows much faster than the white mulberry, and strikes from cuttings as freely as a willow, which is not the case with the latter. The abundance of its leaves is much greater than any other known variety, and, what is most important, it is not only freely eaten by the silkworms, but perfectly agrees with them. Its culture is now superseding that of all others in the south of Europe, and it is even taken as a stock on which to graft the common white mulberry, when the latter is wished for. According to M. Bonafous this may be done either upon layers of the Philippine Mulberry, headed down to one or two eyes above the ground, or upon cuttings seven or eight inches long, which may be planted immediately after having been grafted: the young plants will be five or six feet long the first year, and three or four inches in circumference. This mulberry is sometimes called *Morus multicaulis*.

In this country the white mulberry and all its varieties suffer a good deal from our winters, but not so much as to prevent its cultivation. Some years ago an attempt was made to introduce it and the rearing of silkworms into Great Britain; but the attempt failed, owing partly to unskilful management, but more to the soft juicy condition of the leaves in this damp climate, which rendered them unfit for the food of the worm. For a full and excellent account of the varieties, &c. of the White Mulberry, see Loudon's *Arboretum Britannicum*, vol. iii., p. 1348.

MORUS NIGRA. [MULBERRY.]

MORVAN or MORVANT, LE, a district in France, partly in Nivernois and partly in Bourgogne. As this district does not appear to have been recognised for any administrative purpose, it is difficult to define its limits: it is from 16 to 18 miles long, and 10 to 12 broad. It consists for the most part of a table-land of granite or other primitive rocks, traversed by narrow valleys and watered by numerous streams. It is barren on the whole, though affording in some parts good pasturage, on which a vast number of cattle are kept: other parts are clothed with wood, which affords a great supply of fuel for Paris. [AVALLON.] Buckwheat, oats, and a little rye are the only kinds of grain raised. The towns of Avallon, Saulieu, and Château Chinon are within the district. The Yonne and several of its tributaries are within the border. The origin of the name is not known. Morvan is now included partly in the department of Nièvre, partly in that of Yonne.

MORYSON, or MORISON, FYNES, was a native of Lincolnshire, and born in 1566. He wrote an 'Itinerary, containing twelve years' travels through Germany, Bohmerland, Switzerland, Netherland, Denmark, Poland, Italy, Turkey, France, England, Scotland, and Ireland, in 3 parts,' London, 1617, fol. This work was first written in Latin, and then translated by himself into English. It contains some minute and interesting details of early English manners. He also wrote a 'History of Ireland, from the year 1599 to 1603, with a short Narration of the State of that Kingdom from 1169; to which is added a Description of Ireland,' Dublin, 1735, 2 vols. 8vo. He died about 1614.

MOSAIC, or more correctly MUSAIC (the term being a corruption of *Opus Musivum*), a species of inlaid or tessellated work, made with minute pieces of coloured substances, generally either marble or natural stones, or else glass more or less opaque, and of every variety of hue which the subject may require. The former mode was that chiefly employed by the antients for their costly tessellated pavements, many of which have at various times been discovered in this island, and which prove, more than any thing else, the opulence and luxury in building displayed by the Romans in this distant part of their empire; and further, the time and labour bestowed on the structures, of which they are the remains; since it may fairly be taken for granted that decoration, attended with such difficulty and tediousness of execution, and requiring artificers of a superior class, if not artists, was not introduced except in sumptuous edifices.

Mosaics of this description, that is, for pavements, generally consist only of a series of ornamental borders enclosing one or more compartments containing some figure or device, or occasionally a group or subject. Others consist entirely of a pattern, generally in two colours, sometimes in three—black, white, and red. Examples of pavement mosaics in each of these modes have been discovered at Pompeii, and in many of them the borders very much resemble those upon Greek fictile vases.

Mosaic continued to be used both for pavements and ornamenting walls to a late period in the middle ages, and was greatly practised in Byzantine buildings, and by Byzantine artists, who were also employed in Italy, whence it was sometimes termed *opus Græcum*, or *Græcanicum*. Hessemer gives in his work many specimens of the kind, and among others one from a pavement in the baptistery of Pisa (begun in 1153), which is remarkable, as the compartments form precisely the same pattern as that of the window in the mosque of Hakim at Cairo, represented in the cut, page 383, in MOORISH ARCHITECTURE. In the pavement the lines are a dark green on a white ground, and the spaces, which are perforated in the window, are filled up with *tesseræ* of different forms and colours, placed alternately upon a dark and a white ground.

Ornamental patterns of a similar character, executed in mosaic, and frequently having a considerable intermixture of gold, were frequent, and of embellishment thus executed there are splendid examples in the cathedral of Monreale near Palermo; and it is remarkable that in their geometrical patterns and devices they display a taste very much akin to that of Arabian architects. [MOORISH ARCHITECTURE.] Beautiful specimens of decorative mosaic or inlaid pavements, in a different style from the preceding, occur in the church of San Miniato at Florence, consisting of squares filled up with bold foliage or flower-work in black and white, and which again partake not a little of the character of corresponding decoration in the Moorish and Arabian styles. Patterns very similar to those of such mosaics were also frequently employed for painting walls, of which kind specimens from the church of San Francesco at Assisi, as well as others in mosaic in the same building, may be seen in Hessemer's *Arabische und Alt-Italienische Bau-Verzierungen*.

Something akin to mosaic or coloured inlaid-work was occasionally employed in Italy during the middle ages for external decoration also; as an instance of which the façade of the Duomo at Pisa may be mentioned, where, though the pattern is chiefly in black and white, brilliant reds and blues are intermixed at intervals, a species of external decoration supposed by some to have been derived from the practice of *polychromy* among the Greeks. [POLYCHROMY.]

Although nearly similar as to their process, mosaic pictures, especially some of those of later times, may be considered as a distinct branch of the art. Whether actually employed as pavements or inserted in walls, mosaics of the

class just described consist chiefly of ornament and pattern, executed in few and simple colours, with hardly any attempt at variety of tints and due graduation of tones, even in the figures, human or animal, occasionally introduced in them. The outlines are everywhere distinct and hard; the joints between the *tesseræ*, or separate pieces of material, plainly visible; in short, there is no attempt at pictures; scarcely anything more, in fact, than the suggestions of them, if we may so express it. All these however are rather proprieties than defects, because a direct imitation of nature—any picture, according to the modern idea of the term—would be altogether incongruous and in bad taste applied as the decoration of a pavement or floor. Even for ceilings they are objectionable enough, but for floors pictures would be almost intolerable. It has been conjectured by some however that mosaic-work first suggested the idea of painting, or of describing objects by means of outline and colours upon a plane surface, and confining the composition to figures alone, without any intermixture of pattern-work or arbitrary ornament; and if founded upon nothing better than conjecture, such supposition is highly plausible, the transition from the one to the other being both obvious and easy. Further, such hypothesis is greatly strengthened by our finding that nearly all the specimens of antient painting which have been preserved to us or yet discovered have in them a striking resemblance to the character of mosaic, and but a partial imitation of nature, the figures being in many of them upon a uniform ground, and very few indeed exhibiting more than a partial background and a slight indication of distances.

For a long period after the decline of the arts, mosaic painting continued to be employed in Italy, both externally and internally, for the decoration of churches, as for instance, on the façade as well as within the basilica of St. Mark at Venice. Some have supposed that such productions were entirely the work of Byzantine or Greek artists, but the contrary opinion is firmly maintained by Cicognara, who asserts that mosaic was practised by native Italians, that it was well known to the earliest Venetians, and that consequently it is altogether an error to call Andrea Tafi, a Florentine who lived in the thirteenth century, the first Italian who obtained instruction in the art from Greeks practising it at Venice. The works however, both of Constantinopolitans and Italians of those ages, are more curious than beautiful, rude and uncouth in design, and exhibiting very little of the principles of painting. In fact they bear a far greater resemblance in every respect to the glass-painting in Gothic windows than they do to pictures, and that species of painting may itself be termed a kind of transparent mosaic-work. In neither case is a direct imitation of nature aimed at, but merely a sort of conventional and more or less symbolical representation. The outlines are hard and cutting, the colours forcible and unbroken, nor is there any effect of light and shade. Besides which pictorial imitation is further repudiated by the figures being frequently represented upon a gold ground, a practice afterwards followed by some of the earlier German painters, and in the present day in some of the modern frescoes at Munich.

Pictures in mosaic are comparatively of recent origin, dating not further back than the commencement of the seventeenth century, when copies of celebrated works by Raphael and other masters were for the first time thus executed. Mosaics of this kind are facsimiles of the originals, and have merely the effect of paintings produced in the usual way, although attended with infinitely greater cost, and beyond all comparison more laborious and tedious in their process. As each separate piece of glass is of the same colour throughout, the graduation of tints, the melting off of any one colour from its highest light to its darkest shadow, can be obtained only by an immense number of small pieces, of which those contiguous to each other exhibit scarcely any perceptible difference to the eye. It is said that no fewer than forty thousand different tints, all of which must be kept methodically sorted and arranged, are requisite for this kind of mosaic-work; the preparation of such a palette therefore, for anything upon an extensive scale, must of itself be a task of great labour and time, as well as expense; besides which the execution is so entirely mechanical, that it is fit only for copyists. The sole advantage in any degree proportionate to the cost attending it, is the extreme durability of the work when once accomplished, as its colours can hardly be changed by any length of time; nor is it liable to the slightest decay, or any injury, except what may happen to the structure in which it is fixed. The mosaics in St. Peter's, which are *chefs d'œuvre* of their kind, will last as long as the building itself stands.

Similar mosaic is frequently employed, or rather misapplied, on a miniature scale, for pictures on the lids of snuff-boxes and articles of that kind, or tablets in chimney-pieces, which are at the best mere curiosities and very laborious trifles. *Florentine-work* may also be mentioned as a species of mosaic, chiefly used for inlaying or veneering marble slabs for tables, and decorative purposes of that sort, upon a moderate scale.

The recent adoption of asphalt for pavements may perhaps lead to ornamental decoration for such purposes, somewhat in the style of mosaic in regard to patterns. The floor of the Rotunda in the Bank of England is now thus ornamented in black and white, with compartments radiating from the centre; and such pavements certainly recommend themselves for conservatories, terraces, &c. Although mosaic itself is by far too expensive for any but very rare occasions, the effect of it may be obtained, and the beauty of its patterns produced, in stain-cloth flooring; and the same style of design might also be shown in carpets, and were these more sober in their colours, and more *à l'antique* in their design, the furniture and other decorations of rooms would generally show themselves to greater advantage.

MOSAISK, or MOSHAISK, is the chief town of a large circle of the same name in the government of Moscow. Stein, in 1820, assigns it to the government of Kaluga; but Hassel, in 1821, and all the later authorities, place it in the government of Moscow. It is situated at the junction of the Moshaiska and the Moskwa. It is chiefly celebrated for the events which took place in its vicinity in 1812. On the 5th September the French under Napoleon attacked the Russian army under General Kutusow, and carried a strong redoubt which was the key of the Russian position. On the 7th was fought the great battle in which the loss of both armies was immense; that of the Russians was stated at 30,000 men: the loss of the French was in all probability at least equal; but the battle opened to Napoleon the way to Moscow. These two engagements are called by the French, respectively, the battle of Borodino and the battle on the Moskwa: the Russians generally call both engagements the battle of Borodino. Almost the whole of the town was reduced to ashes on the occasion; but it has since been rebuilt, and is much handsomer than it was before. The inhabitants, above 4000 in number, carry on a considerable trade in corn and timber.

MOSAMBIQUE. [Mozambique.]

MOSASAURUS, Mr. Conybeare's name for a gigantic extinct aquatic Saurian, *Saurochampsa* of Wagler, considered by Faujas St. Fond to be a crocodile, but whose true position among the Saurians was pointed out by Camper and confirmed by Cuvier. Indeed, previous to their investigations, the nearly perfect head of this Saurian, known as the great animal of Maastricht, and found near that city in the calcareous freestone forming the most recent deposit of the cretaceous formation, was a stumbling-block to naturalists, some of whom were of opinion that it was a whale. The zoologists last named, and especially Cuvier, have satisfactorily proved that it was a great marine reptile, and very nearly allied to the Monitor. [Monitors.] The teeth are without true roots, not hollow as in the crocodile, but solid throughout, and joined to the sockets by a broad bony basis, the result of the hardening of the pulp from which the teeth were formed, and likewise attached to the jaw by the ossification of the pulp that had furnished the enamel. 'This indurated capsule,' writes Dr. Buckland, in his 'Bridgewater Treatise,' 'passed like a circular buttress around its base, tending to make the tooth an instrument of prodigious strength. The young tooth first appeared in a separate cell in the bone of the jaw, and moved irregularly across its substance, until it pressed against the base of the old tooth; causing it gradually to become detached, together with its base, by a kind of necrosis, and to fall off like the horns of a deer. The teeth in the roof of the mouth are also constructed on the same principle with those in the jaw, and renewed in like manner.'

The last-mentioned writer places its organization and its zoological and geological relations in so interesting a point of view in the treatise above mentioned, that we select his account as the best calculated to inform the general as well as the philosophical reader on these points.

The geological epoch at which the Mosasaurus first appeared, seems to have been the last of the long series during which the oolitic and cretaceous groups were in process of formation. In these periods the inhabitants of our planet seem to have been principally marine, and some of the largest creatures were Saurians of gigantic stature, many of them living in the sea, and controlling the excessive increase of the then extensive tribes of fishes. From the lias upwards to the commencement of the chalk formation, the Ichthyosauri and Plesiosauri were the tyrants of the ocean; and just at the point of time when their existence terminated, during the deposition of the chalk, the new genus Mosasaurus appears to have been introduced, to supply for a while their place and office, being itself destined in its turn to give place to the Cetacea of the tertiary periods. As no Saurians of the present world are inhabitants of the sea, and the most powerful living representatives of this order, viz. the Crocodiles, though living chiefly in water, have recourse to stratagem rather than speed for the capture of their prey, it may not be unprofitable to examine the mechanical contrivances by which a reptile, most nearly allied to the Monitor, was so constructed as to possess the power of moving in the sea, with sufficient velocity to overtake and capture such large and powerful fishes as, from the enormous size of its teeth and jaws, we may conclude it was intended to devour. The head and teeth point out the near relations of this animal to the Monitors; and the proportions maintained throughout all the other parts of the skeleton warrant the conclusion that this monstrous Monitor of the antient deep was five and twenty feet in length, although the longest of its modern congeners does not exceed five feet. The head here represented measures four feet in length, that of the largest Monitor does not exceed five inches. The most skilful anatomist would be at a loss to devise a series of modifications by which a Monitor could be enlarged to the length and bulk of a Grampus, and at the same time be fitted to move with strength and rapidity through the waters of the sea; yet in the fossil before us, we shall find the genuine characters of a Monitor maintained throughout the whole skeleton, with such deviations only as tended to fit the animal for its marine existence.

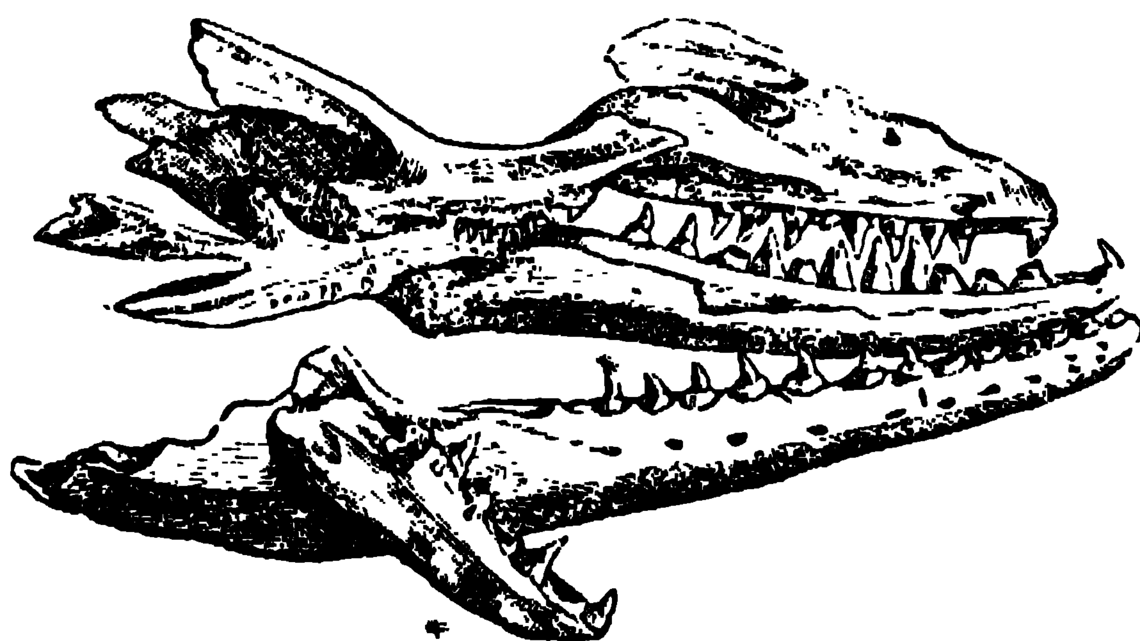
'The Mosasaurus had scarcely any character in common with the Crocodile, but resembled the Iguanas in having an apparatus of teeth fixed on the pterygoid bone, and placed in the roof of its mouth, as in many serpents and fishes, where they act as barbs to prevent the escape of their prey.

'The other parts of the skeleton follow the character indicated by the head. The vertebræ are all concave in front and convex behind; being fitted to each other by a ball and socket joint, admitting easy and universal flexion. From the centre of the back to the extremity of the tail, they are destitute of articular apophyses, which are essential to support the back of animals that move on land: in this respect they agree with the vertebræ of Dolphins, and were calculated to facilitate the power of swimming; the vertebræ of the neck allowed to that part also more flexibility than in the Crocodiles.

'The tail was flattened on each side, but high and deep in the vertical direction, like the tail of a Crocodile; forming a straight oar of immense strength to propel the body by horizontal movements analogous to those of skulling. Although the number of caudal vertebræ was nearly the same as in the Monitor, the proportionate length of the tail was much diminished by the comparative shortness of the body of each vertebra; the effect of this variation being to give strength to a shorter tail as an organ for swimming; and a rapidity of movement, which would have been unattainable by the long and slender tail of the Monitor, which assists that animal in climbing. There is a further provision to give strength to the tail, by the *chevron* bones being soldered firmly to the body of each vertebra, as in fishes.'

The total number of vertebræ was one hundred and thirty-three, nearly the same as in the Monitors, and more than double the number of those in the Crocodiles. The ribs had a single head, and were round, as in the family of Lizards. Of the extremities, sufficient fragments have been found to prove that the Mosasaurus, instead of legs, had four large paddles, resembling those of the Plesiosaurus and the Whale: one great use of these was probably to assist in raising the animal to the surface, in order to breathe, as it apparently had not the horizontal tail by means of which the Cetacea ascend for this purpose. All these characters unite to show that the Mosasaurus was adapted to live entirely in the water, and that although it was of such vast proportions compared with the living genera of these families, it formed a link intermediate between the Monitors and the Iguanas. However strange it may appear to find its dimensions so much exceeding those of any existing Lizards, or to find marine genera in the order of Saurians, in which there exists at this time no species capable of living in the sea; it is scarcely less strange than the analogous deviations in the Megalosaurus and Iguanodon, which afford examples of still greater expansion of the type of the Monitor and Iguana into colossal forms adapted to move upon the land. Throughout all these variations of proportion, we trace the persistence of the same laws which regulate the formation of living genera, and from the combinations of perfect mechanism that have, in all times, resulted from their operation, we infer the perfection of the wisdom by which all this mechanism was designed, and the immensity of the power by which it has ever been upheld.

'Cuvier asserts of the Mosasaurus, that before he had seen a single vertebra, or a bone of any of its extremities, he was enabled to announce the character of the entire skeleton, from the examination of the jaws and teeth alone, and even from a single tooth. The power of doing this results from those magnificent laws of co-existence which form the basis of the science of comparative anatomy, and which give the highest interest to its discoveries.'



Head of Mosasaurus Camperi. (Lacerta gigantea of Sömmering.)

The noble specimen from which the cut is taken was discovered in 1780, and is in the Museum at Paris. At the capture of Maastricht by the French army it was given up to them for the purpose of being placed in the Museum, according to Cuvier, by Goddin, dean of the chapter of that town, which, in virtue of some droits of the chapter, had taken it from Hoffman, of whose collection it formed the principal feature. It is said that the French cannoneers had directions not to point their artillery towards that part of the town in which this precious specimen was deposited. Casts are preserved in the British Museum, and in the museums of the Geological Society and of the Royal College of Surgeons.

Localities.—Maastricht, upper chalk in England (Mantell, near Lewes), green-sand of Virginia (Morton), Sandy Hook and Woodbury, New Jersey. [MAASTRICHT ROCKS.]

MOSCHATA, a name proposed by M. Renieri for a genus of *Actiniæ*, or soft *Zoantharia*, which a little resembles *Holothuria*, and lives in the sea, wherein it floats free.

Example, *Moschata rhododactyla*.

Localities.—Mediterranean and Adriatic seas.

MOSCHEROSCH, JOHANN MICHAEL, a German writer of the seventeenth century, generally known under the pseudonym of Philander von Sittewald, was born 5th of March, 1600, at Willstadt, a small town in Hanau-Lichtenberg, where his father was preacher. Respecting his life few particulars of any interest are known, for all may be comprised in the statement that, after studying at Strasburg, he filled successively a variety of appointments, until, in 1656, he was made president of the consistory at Hanau; and that he died, April 4, 1669, at Worms, while upon a journey to visit his son at Frankfort on the Main.

As a writer he obtained much popularity in his time by his 'Wünderliche und wahrhafte Gesichte Philanders von Sittewald,' in two vols., 1650, a collection of satirical pieces in the form of visions, a species of fiction greatly in vogue at that period as the vehicle of satire and allegory. Moscherosch may in fact be termed the German Quevedo, his *Gesichte* being to a certain extent a paraphrase of the Spaniard's *Sueños*, with adaptations to the manners and foi-

ples of his own countrymen. Notwithstanding too that his style falls short of the concise terseness and energy which mark his original, he may be considered one of the best German prose-writers of the seventeenth century, gifted with great humour, and displaying not only considerable knowledge of the world, but also great force of satire and ridicule, both serious and comic.

MO'SCHIDÆ, a family of ruminant quadrupeds familiarly known as *Musk Deer*.

Linnæus defines the genus *Moschus*, which he places between *Camelus* and *Cervus*, under his order *Pecora*, as having no horns, and the upper canine teeth solitary and exserted—'Cornua nulla. Dentes Laniarii superiores solitarii exserti.'

Pennant, in the Systematic Index, gives it nearly the same position, the only difference being that the Deer precedes it, and the Camel follows it.

Cuvier, in his last edition of the 'Règne Animal,' gives it the same position that Linnæus assigned to it; the Llamas (among the Camels) immediately preceding it, and the Deer (*Cervus*, Linn.) being next in succession to it. The French zoologist states that the Musks are much less anomalous than the Camels, and only differ from the other Ruminants in the absence of horns, in having a long canine tooth on each side of the upper jaw, which comes out of the mouth in the males, and finally, in having in their skeleton a slight fibula, which has no existence in the Camels. He adds that they are charming animals in regard to their elegance and lightness. The distinction of the exserted upper canine tooth, noticed by Cuvier, is not confined to the Musks; such a conformation exists in some of the males of the *Cervidæ*, the Munjak for instance.

Mr. Swainson is of opinion that the *Moschidæ*, or Musk Deer, constitute the most aberrant group of the Ruminants, and he places them between the *Cervidæ* and the *Camelopardæ*, the last family being the terminating group of his fourth tribe, or Ruminants.

M. F. Cuvier enumerates *Moschi moschiferus*, *Meminna*, *pygmæus*, *Javanicus*, and *Napu*, as the only species known at present.

Mr. Gray, in his *Disposition of the Mammalia* (*Annals of Phil.*, 1825) divides the family *Bovidæ* into two sections, the first with persistent horns, and the second with either no horns or deciduous horns. He makes *Moschina* the fourth subfamily, and arranges it between *Camelina* and *Cervina*, in the second section. The genera of *Moschina*, in this arrangement, are *Moschus* and *Meminna*. The same author, in June, 1836, read to the Zoological Society of London some observations 'On the genus *Moschus* of Linnæus, with descriptions of two new species.' He remarked that the only character by which this genus, as established by Linnæus and others, differs from the genus *Cervus*, consists in the absence of horns; for the elongated canines are common to it and most of the Indian species of *Cervus*, especially the *Cerv. Muntjac*. [DEER, vol. viii., pp. 362, 363.]

The character of the fur, the degree of hairiness or nakedness of the *metatarsus*, and the presence or absence of the musk-bag of the male, offer however, he observed, good characters for the subdivision of the group into three very distinct sections or subgenera.

The first of these divisions, for which Mr. Gray would retain the name of *Moschus*, comprehends only the *Thibet Musk*, *Moschus moschiferus*, Linn. In common with the *Deer* and *Antelopes*, it has, he pointed out, the hinder and outer side of the *metatarsus* covered with close erect hair, and, like many of the *Deer* also, its fur is quill-like and brittle; the throat moreover is entirely clothed with hair, and the males are provided on the middle of the abdomen with a large pouch secreting musk. Its young, like those of most of the *Deer*, are spotted, whilst the adult animal is plain-coloured.

Mr. Gray further stated that the division to which, in the year 1821, in a paper in the 'Medical Repository,' he gave the name of *Meminna*, also consists of but a single species, the *Moschus Meminna*, Linn. In this group the hinder edge of the *metatarsus* is, he observed, covered with hair; and there is no musk-bag in either sex. The false hoofs, he remarked, are distinct, although Linnæus and Buffon denied their presence.

The third and last subdivision is characterised by Mr. Gray, under the name of *Tragulus*, as having the hinder edge of the metatarsus nearly bald and slightly callous, a character which distinguishes them at once from all other Ruminants; the fur is soft, and adpressed like that of *Meminna*, but not spotted even when young; the throat is provided with a somewhat naked, concave, sub-glandular, callous disk, placed between the rami of the lower jaw, from which a band extends to the fore part of the chin; and they have no musk-bag. Like all the other species of the Linnean genus *Moschus*, they have false hoofs; and most of them have the edges of the lower jaw, three diverging bands on the chest, and the under surface of the body, more or less purely white. The species of this division scarcely differ in colour in the various stages of their growth, the young fawn resembling the adult in every particular except in size.

In this division, the synonymy of which is stated to be extremely confused, Mr. Gray reckons four species, two of which he describes as new. Mr. Gray stated that he was unable to identify with any of the four species mentioned by him on this occasion, or to separate from them as distinct, the *Palendoc*, figured in Marsden's 'Sumatra,' or the *Pygmy Musk* of Sumatra, figured in Mr. Griffith's edition of Cuvier's 'Animal Kingdom,' on which Fischer has established his *Moschus Griffithii*. The *Moschus pygmæus* of Linnæus, in Mr. Gray's opinion, belongs to the genus *Antilope*; the hinder part of the tarsus being covered with hair, and the false hoofs very small and rudimentary, and entirely hidden under the hair of the feet. He thinks that the *Moschus Americanus* appears by its spotted livery to belong to a species of *Deer*; and that the *Moschus delicatulus*, or *Leverian Musk* of Shaw, is undoubtedly the fawn of a deer. Mr. Gray further observed that it is curious that Dr. Shaw quotes as a synonym of the last-named species the figure of Seba, on which alone the *Moschus Americanus* is founded, while at the same time he enumerates the *Moschus Americanus* as a distinct species. (*Zool. Proc.*, 1836.)

In the same year Mr. Ogilby, in his paper on the *Ruminantia*, read before the Zoological Society, makes the *Moschidæ* the third family of that order, with the following character:—

Feet bisulcate; horns none; incisor teeth (primores), above none, beneath eight. Two genera.

1. *Moschus*. Rhinaria large. Lachrymal sinuses none; interdigital fossæ none; inguinal follicles none; teats four. Type *Moschus Moschiferus*.

2. *Ixalus?* Rhinaria none. Lachrymal sinuses small and distinct. Interdigital fossæ none. Inguinal follicles small. Teats two. Type, *Ixalus Probaton*. (*Zool. Proc.*, part iv., p. 119.)

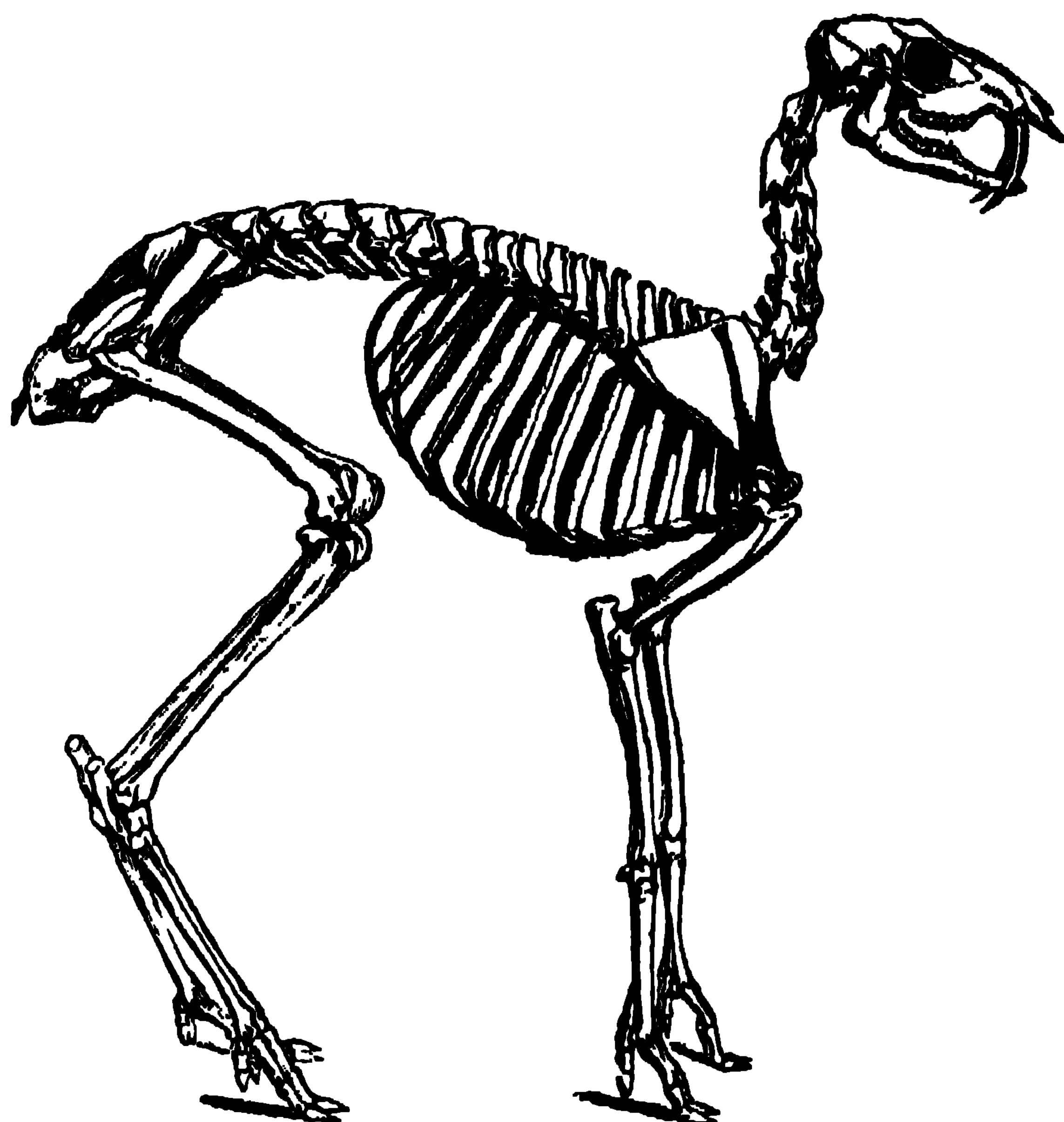
Mr. Ogilby goes on to state that the genus *Ixalus*, founded upon the observation of a single specimen, may eventually prove to belong to a different family: and indeed he observes that it differs little from the true antelopes; but even supposing it to be correctly placed among the *Moschidæ*, other forms, Mr. Ogilby remarks, are still wanting to fill up the chasms which evidently exist among the characters of that group. 'Two,' continues Mr. Ogilby, 'are more especially indicated, and our knowledge of the laws of organic combination, and of the constituent parts of other groups, gives us every reason to believe in their actual existence, and to anticipate their discovery.' He then proceeds to characterise the genera *Hinnulus* and *Capreolus*, observing that they will probably be found, one in the tropical forests of the Indian archipelago, and the other on the elevated table-lands of Mexico or South America.

'It may appear a bold, perhaps a presumptuous undertaking,' says Mr. Ogilby, 'thus to predict the discovery of species and define the characters of genera, of whose actual existence we have no positive knowledge; but, as already remarked, all the analogies of nature, whether derived from organic combination, or from the constituent members of similar groups, are in favour of the supposition; and I may observe further, that the recent discovery of the genus *Ixalus*, if indeed it eventually prove to be a genus, of which I had long previously defined the characters, as I have here done for the presumed genera *Hinnulus* and *Capreolus*, strengthens my belief in the actual existence of these forms, and increases the probability of their future discovery.' The family is placed by Mr. Ogilby between the *Cervidæ* and *Capridæ*.

The same author makes *Tragulus* (type *Antilope pygmæa*) the first genus of his family *Bovidæ*.

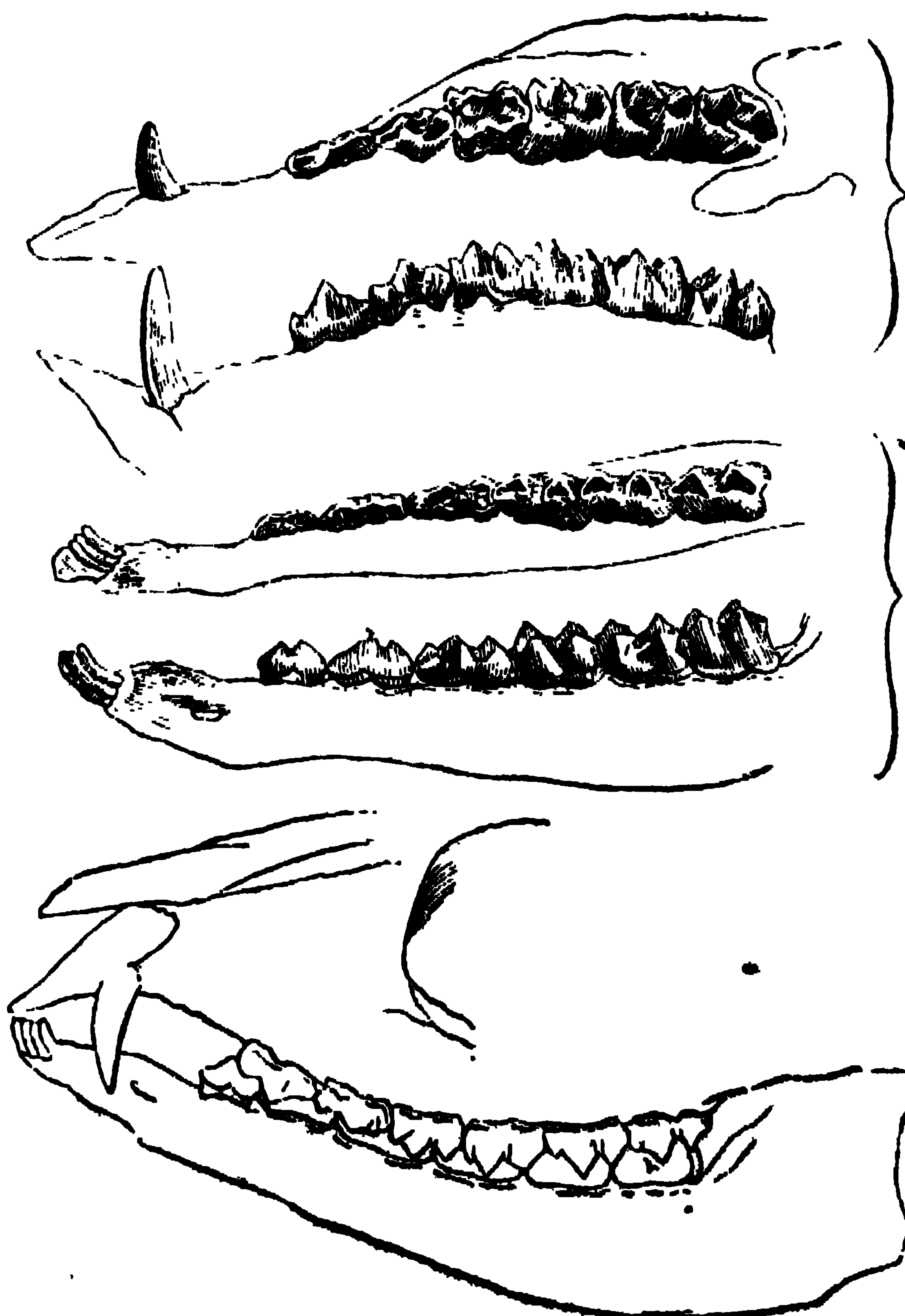
ORGANIZATION.

The *Moschidæ* do not differ much from the other Ruminants; the leading differences are given above, and the general osseous structure of the form may be collected from the following cuts.



Skeleton of Moschus Moschiferus.*

Dental Formula:—Incisors, $\frac{0}{8}$; canines, $\frac{1-1}{0-0}$; molars $\frac{6-6}{6-6} = 34$.

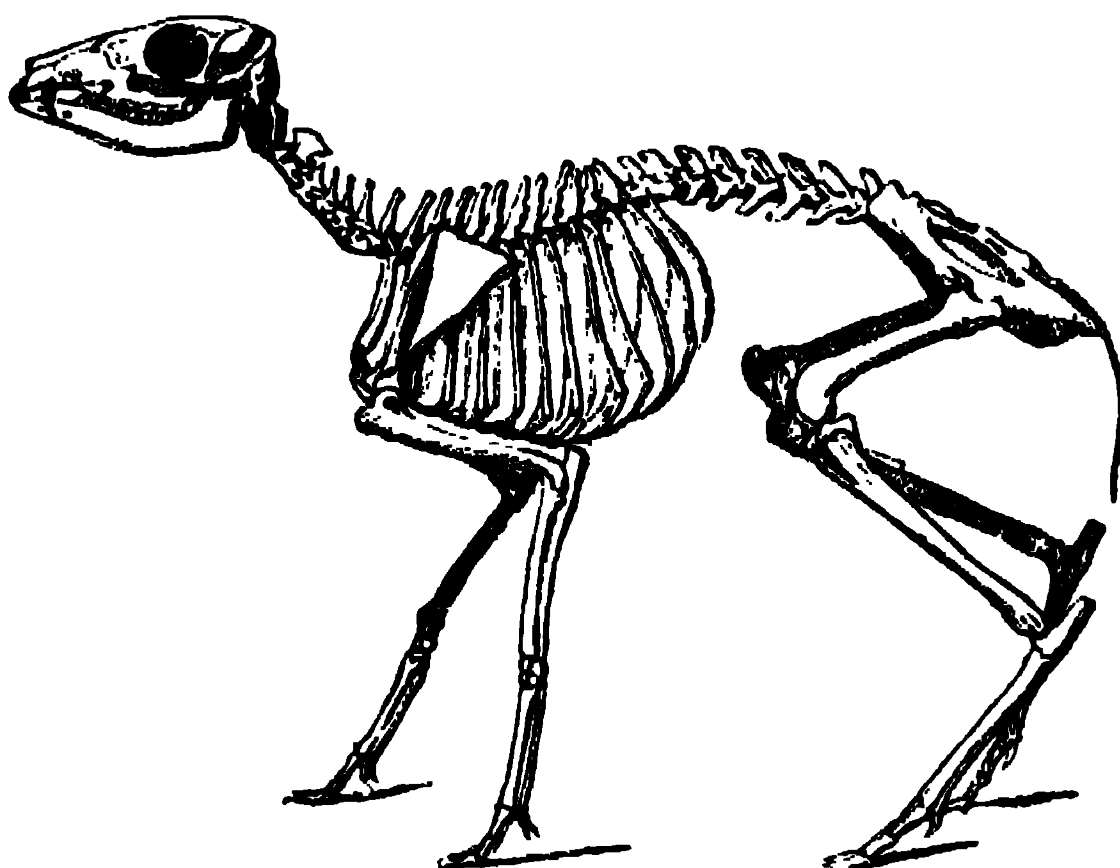


Teeth of Moschus Moschiferus. (F. Cuv.)

The canine teeth go far back into the upper jaw, as will be seen from the following figure of one of them. It is not impossible that the so-called canine teeth of *Ursus cultridens* may be the canine teeth of an extinct ruminant allied to this family, or that of the *Cervidæ*. [MACHAIRODUS.]



Canine Tooth of Moschus Moschiferu



Skeleton of Meminna.*

Genera. Moschus.

Generic Character.—See above.

Example, *Moschus moschiferus*, the *Musk* or *Tibet Musk*.

Description.—Somewhat of the form of a roebuck; but higher behind than it is at the shoulder, from the upper part of which to the sole of the foot it measures about two feet three inches; whilst from the top of the haunches to the soles of the hind feet the measurement is about two feet nine inches. Ears long and rather narrow, in the inside pale-yellow and dark-brown outside. Hair on the body suberect, long, each hair marked with short waves from top to bottom, ash-coloured near the base, black or blackish near the end, and rusty at the tips. Chin yellow. The colours vary. Most of the adults are plain-coloured. In some, and such is the individual figured by Pennant, the fore part of the neck is marked on each side with long white stripes from the head to the chest, the back striped transversely with pale brown reaching to the sides, which are also dappled with a lighter colour.† Hoofs very long and deeply divided, spurious hoofs very long. Tail about an inch long, concealed in the hair. Scrotum rutilum. Penis vix percipiendus. (Pennant.)

Female less than the male and wants the two tusks.

Young, spotted.

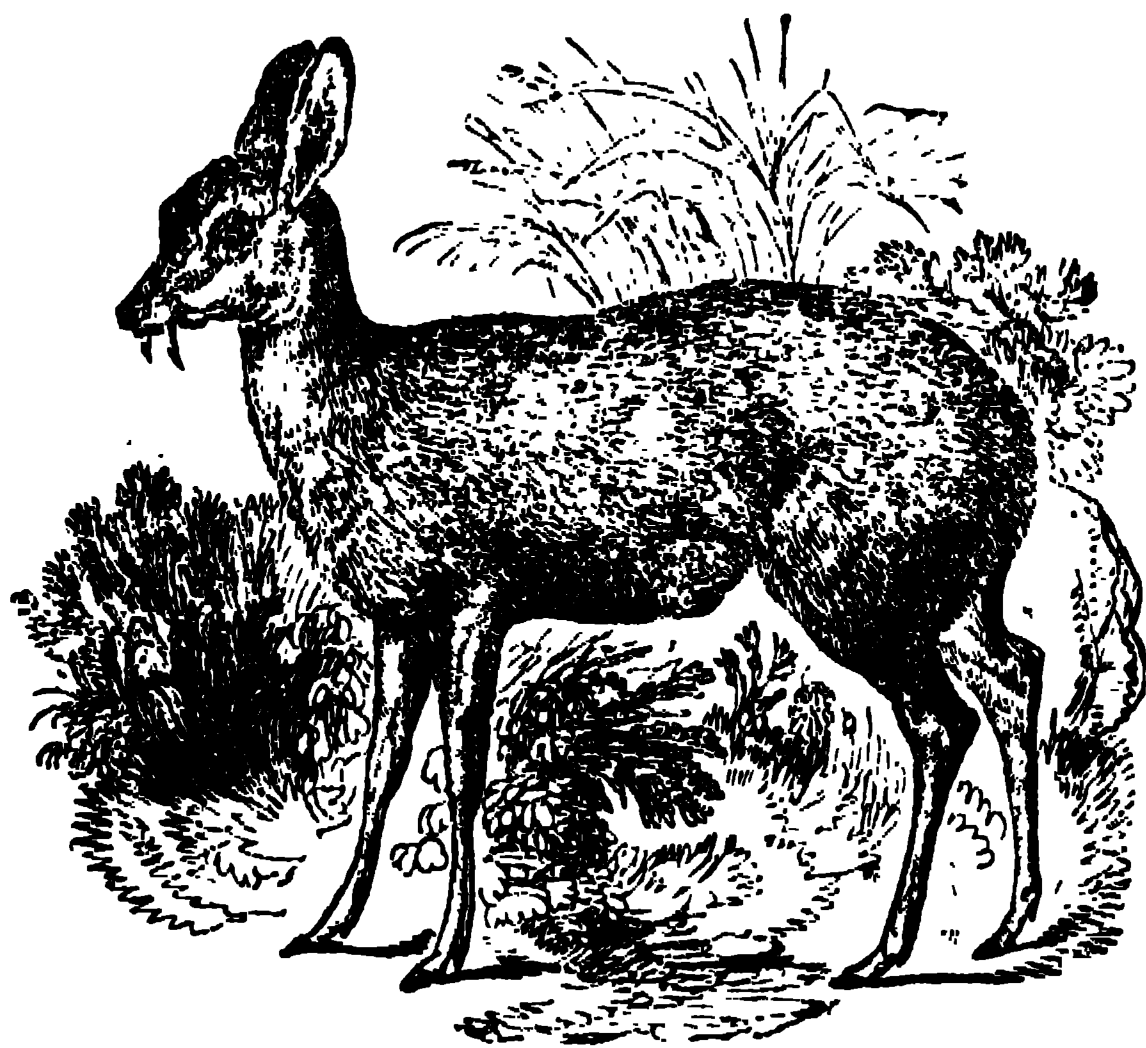
Habits; Food; Utility to Man.—The *Musk* is a mountain-animal, timid and shy, and a lover of solitude. Precipices covered with pines and almost inaccessible crags are its favourite haunts; and the musk-hunter often perils his life in the dangerous chase, for when hotly pursued, the animal takes refuge frequently in the highest fastnesses, leaving men and dogs with scarcely the possibility of access to the precipitous summits to which it flies. And yet the slaughter made among them must at one time have been great, and the animals abundant; for Tavernier bought in one journey 7673 musk-bags. The bag, or tumor, containing this well known drug is peculiar to the male: it is kidney-shaped, pendulous, of the size of a hen's egg, and situated beneath the abdomen. There are said to be two apertures, the larger oblong, the smaller round, and covered with hair: and on the application of pressure, the musk may be forced through the apertures. It is brown and unctuous. This bag the hunters cut off, and tie it up for sale, but, like everything that is calculated for the use of man and is the object of commerce, it is said to be adulterated by the admixture of foreign matter, and pieces of lead are stated to

* These figures are taken from specimens in the museum of the College of Surgeons by permission of the Museum Committee.

† But note, this may have been a young animal.

have been found enveloped in it, for the purpose of increasing the weight. The musk which comes from Tibet is considered the best, and used to bear the highest price; the bag is more or less full, and the quality more or less good, according to the age and health of the animal. When dry, musk is dark-brown, inclining to red, or rusty-black, and appears more or less granulated. To the taste it is rather bitter and somewhat acrid. It is perhaps the strongest and most pungent of perfumes, and so subtle that everything near it becomes infected, and for a long time retains the odour; vessels of silver even, a metal which, as much as, if not more than others, readily becomes purified from odorous substances, do not part with the scent of musk, which may have been placed in them, for a long time. When fresh or exposed in large quantities, its effects upon the nervous system are said to be absolutely violent; and it is stated that blood has been forced from the nose, eyes, and ears of those who have imprudently inhaled the vapour of a considerable quantity. When Chardin made his purchases, he secured himself from the sudden effects of the smell by covering his face with a handkerchief several times folded. The mere skin of the animal fills the place where it is kept with the perfume for a long period. In medicine it is used for nervous and convulsive cases in considerable doses. The flesh of the animals, though that of the males is rather highly flavoured with musk, is eaten by the Russians and Tartars. In rutting-time this flavour is most predominant.

Localities.—Tibet. The province of Mohang Meng in China, Tonquin, and Bootan; about the lake Baikal, and near the rivers Yenesei and Argun. Found from lat. 60° to 44° or 45°; but never wanders so far south, except when forced through hunger, by great falls of snow, when it migrates to feed on corn and new-grown rice. (Pennant.)



Moschus Moschiferus.

The description given by Linnæus of this species is an example of his great neatness. He describes the Tibet musk as Moschus *folliculo umbilicali;* and this is the distinction of the species, as far as we yet know. It does not appear to have been known to the antients, but seems to have been first mentioned by the Arabians. Serapion described it in the eighth century.

Meminna.

Generic Character.—See above.

Example, *Moschus Meminna,* Linn. The only species known.

Description.—Length about 17 inches. Ashy-olive; throat, breast, and belly white, sides and haunches spotted and barred transversely with white: ears large and open, tail very short. Weight about five pounds and a half.

Locality.—Ceylon and Java. (Pennant.) Col. Sykes informs us that it is the *Peesoreh* of the Mahrattas, and that it is found in considerable numbers in the dense woods of the Western Ghauts, but never on the plains. (*Zool. Proc.,* 1831.) Pennant described it from a drawing communicated by Governor Loten, of Ceylon.



Meminna.

Tragulus.

Generic Character.—See above.

Example, *Tragulus Javanicus,* Pallas; *Moschus Javanicus,* Gmel., Raffles; *Moschus Napu,* F. Cuvier.

Description.—Size of a large hare. Body heavy. Limbs very delicate. Head arched and long. Eyes large but not expressive. General colour brown mixed with blackish-grey or yellow reflections; yellow predominating along the back and tail, on the legs, the neck, and head; the grey and black prevail on the lower part of the shoulders, on the sides, and thighs. These different tints are the result of the colouring of the hairs, which on those parts which are yellow are of that colour for the greatest part of their length and black at the point, and where the hairs lie very thick and one on the other, some of the parts appear black. Lower jaw white; two white lines which spring from it, extend from thence beyond the cheeks; two other white bands spring from the same point as the first, and terminate at the shoulders; a middle band descends on the breast, widening in its descent, and is lost in the white of that part. The upper edge of the two first white bands is bordered with black, and the other bands are all separated from each other by hairs of a brownish-black colour. Belly, anterior and upper part of the hind legs, posterior and upper part of the fore legs, and the under part of the tail white. End of the muzzle naked. Eyes surrounded with a naked part, from which springs a band without hairs which goes to the muzzle. These naked parts are black with a slight tint inclining to violet. The toes are united, by a rather loose membrane, nearly to the origin of the hoofs, which are very long and pointed; the spurious hoofs are also long, cylindrical, and pointed. Length about 24 inches. Height to the shoulder rather more than nine inches, to the top of the haunches rather more than a foot.

Mr. Bennett observes that M. F. Cuvier regards five ra-



The Napu.

diating bands as the distinctive character of the *Napu*, and three as that of the *Kanchil;* whereas, in truth, the number is the same in both, and the difference is only in their disposition.

Localities.—Java and Sumatra.

Habits.—Sir Stamford Raffles states that this species frequents thickets near the sea-shore and feeds principally upon the berries of a species of *Ardisia.* He adds that it can be easily trained, when taken young, and will become quite familiar.

Mr. Gray refers also to this genus *Moschi Kanchil* (*Javan Musk* of Shaw, *Le Chevrotain de Java* of Buffon); *fulviventer* (*Le jeune chevrotain* of Buffon); and *Stanleyanus*, of which last, in 1836, there were four living specimens in the magnificent collection of the Earl of Derby at Knowsley; and two others, consisting of a specimen of each of the varieties, in that of the Zoological Society of London, the gift of her present majesty. With the exception of the last, whose locality is not known, these are Oriental, the *Kanchil* being an inhabitant of Java, and the *Tragulus fulviventer* a native of the Malacca Islands and the East Indian Peninsula, but the habitat of *Tragulus fulviventer* is given by Mr. Gray with a query.

Fossil Moschidæ.

The following species are recorded: *M. antiquus*, Kaup (Eppelsheim sand). *M. Bengalensis*, (Tertiary, north-east border of Bengal, Pentland). *M. Prattii* (Tertiary, Isle of Wight, Pratt). Dr. Schinz also mentions the teeth of these ruminating animals as occurring in the Tertiary coal of Zürich; of which, one, he says, is scarcely larger than the teeth of the small musk; the other belongs to a species of deer. Remains of Moschus are also mentioned by Jaeger (Tertiary, Bean iron-ore (Bohnerz) of the Rauh Alp).

MOSCHOPU'LUS, MANUEL. Several treatises on grammar, attributed to a Greek writer of this name, are extant; but there is some difficulty in saying who he was and when he lived. The opinion generally received appears to be that there were two of the name: an elder, called Moschopulus of Crete, or the Grammarian; and a younger, who is called his nephew. The elder probably lived under Michael VIII., Palæologus, about 1270. Some writers have spoken of a third Moschopulus, who taught Greek in Italy in the latter part of the fifteenth century; but this fact does not seem well established, and we may perhaps attribute all the works extant under the name of Moschopulus to the uncle and nephew above mentioned.

Among these works are, 'Erotemata, or Grammatical Questions,' Basel, 1540; 'A Collection of Atticisms;' 'On Grammatical Exercise;' 'A new Epitome of Grammar;' 'On the Construction of Nouns and Verbs;' 'On Prosody;' 'Scholia on Hesiod and Pindar;' &c. Titze published at Leipzig and Prague, in 1822, 'Manuelis Moschopuli Cretensis Opuscula Grammatica,' 8vo., which contains several pieces attributed to Moschopulus which were never before printed. See also Bachmann's 'Anecdota,' vol. ii.

MOSCHUS, a native of Syracuse, and a pastoral poet, probably lived in the third century B.C., and was the friend, and, some say, the disciple, of Bion of Smyrna, whose death he deplores in pathetic strains in one of his compositions, entitled the 'Epitaph of Bion.' We know nothing more of Moschus. There remain of his compositions four Idylls and a few other small pieces. The Idylls are characterised by great elegance and delicacy, but are perhaps somewhat too highly polished, and overloaded with ornament. The Idyll entitled 'Cupid Runaway' is a lively little composition. The Idylls of Moschus were published, together with those of Bion, at Bruges, 1565. There have been other editions of Moschus: one of the best is by Manso, 1784 and 1807. Bion and Moschus have been inserted in most editions of Theocritus, and are also in the collections of Brunck, Gaisford, and Boissonade. Moschus has been translated into German by J. H. Voss and others.

MOSCOW (in Russian, MOSKWA), one of the eight governments of Great Russia, is situated nearly in the centre of European Russia, between 54° 40′ and 56° 30 N. lat., and 35° 10′ and 38° 40′ E. long. It is bounded on the north-west by Twer, on the north-east by Wladimir, on the south-east by Riäsan, on the south by Tula, on the south-west by Kaluga, and on the west by Smolensk. Its area, according to Stein, Schubert, and Cannabich, is 10,000 square miles, but Hermann makes it 11,000, and Hörschelmann 12,000 square miles. The population is now nearly 1,500,000, so that, though one of the least extensive, it is one of the most populous provinces of the empire. It is divided into thirteen circles.

The face of the country is an undulating plain, here and there broken by groups of low hills and the steep banks of the rivers; it is not indeed quite uniform, but nowhere presents any grand or romantic scenery: only the environs of the immense capital have any attractive spots, most of which however owe their beauties to art. The soil is for the most part loam and sand, with some heath and marsh; and on the whole the land is but moderately fertile. Boulders of various kinds of rock are everywhere met with in more or less abundance on the surface, or in the beds of clay and sand, and granite in large blocks (erratic blocks?), as in the north of Germany.

This government is most amply provided with water, there being, according to Storch, 109 lakes, none of which however are of any great extent, and 2610 rivers and streams. The principal rivers are, the Wolga, which indeed only just touches the province for a short distance in the north: the Oka, which flows in the south; and the Moskwa, which gives its name to the government and to the capital. The rivers are in general frozen about the middle of November, and thaw by the end of March. The whole length of the winter, including the more genial days of the autumn and the spring, is reckoned to be five months.

Agriculture is the chief occupation of the inhabitants, and Moscow is one of the best cultivated as well as one of the most populous provinces of the whole empire. As the soil is but moderately fertile, and the immense capital consumes a vast quantity of corn, the crop is never sufficient, even in good years, for the supply of the inhabitants, and large quantities are therefore imported. Flax, hemp, and hops are cultivated by the farmers for their own use, but the manufacturers must obtain their supplies elsewhere. Horticulture is carried on to a great extent, and the produce is nearly adequate to the consumption; most vegetables flourish, especially those which the Russians prefer, such as turnips, carrots, onions, garlick, cabbages, cucumbers, and gourds; but the better kinds of garden vegetables are cultivated in the environs of Moscow, especially asparagus, which is celebrated all over the empire for its size and fine flavour. Fruit is scarce, and though apples, pears, and cherries thrive, in fact only apples are attended to. The best sort of apple is of Chinese origin; it is called Naliwy; is transparent, juicy, and pretty well flavoured. There are likewise many plums.

In general there is no want of wood for timber or fuel. The breed of cattle, like the agriculture, is not sufficient for the supply of the province, which requires a great importation, not only of cattle, but of wool, tallow, &c. What the inhabitants chiefly attend to are domestic poultry and calves, for which they are sure of obtaining a good price in the capital. Some attempts have been made of late years to improve the breed of sheep, but with little success, as the climate does not agree with the Merinos. More attention has been paid to the breed of horses, and there are ten considerable studs, some of which belong to the crown. Game is not abundant; the sportsman finds only hares and birds. Bears and wolves have not yet been extirpated in the great forests. Most of the rivers and lakes abound in fish, but are far from yielding sufficient for the consumption of the people. The minerals are freestone, potters' clay, brick-clay, lime, gypsum, alabaster, and bog-iron.

Manufactures of various kinds are carried on to a great extent, both by the country-people for their own supply as well as for sale, and also in the villages and towns, and especially in the capital. The number of manufactories has increased rapidly. In 1808 there were 394 large manufactories of woollen cloths, hats, silks, leather, chintz and calico, linen, cotton, paper, china, earthenware, &c. &c. There are many distilleries and breweries, and numerous small manufactories; in fact almost every family in the country has some kind of manufacture. In 1830 the number of large manufactories had increased to 750.

The province has of course no maritime commerce, but its inland trade is very extensive; Moscow, from its wealth and industry, being necessarily one of the greatest emporia in the interior. Moscow may indeed be called the centre of the internal trade of Russia, as St. Petersburg is of its maritime commerce. Other towns of this province, are—1. *Kolomna*, on the river Kolomenka at its junction with the Moskwa. The town, which is divided by the Kolomenka into two parts, contains 17 churches, an ecclesiastical seminary,

nd a population of 10,200 inhabitants, who have manufactures of silk, cotton, linen, woollen cloths, and leather. There are several tanneries, and malt and brick kilns; above 400,000 poods (the pood at 36 lbs.) of tallow are annually melted here. The inhabitants have a very extensive trade in tallow, hides, leather, corn, hemp, oil, hops, and fruits from the Ukraine, all which find their way to Moscow; and they supply the neighbouring country with colonial produce, wines, and manufactures. The fairs are much frequented. 2. *Serpuchow*, on the rivers Nara and Oka, over the latter of which there is a bridge of boats. The citadel, on an eminence, is surrounded by a high wall, now fallen into decay; the town has 16 churches, a lazaretto, and other public buildings, and 6000 inhabitants, who have manufactures of sailcloth, woollens, leather, and paper. They have a good trade in corn, cattle, tallow, hemp, linen, and timber, which go partly to Petersburg and partly to Moscow. There are two fairs. 3. *Wereja*, on both sides of the Protwa, over which there is a wooden bridge. The inhabitants, 6000 in number, have a brisk export trade in the same articles as Serpuchow, with Moscow, Petersburg, Riga, and Königsberg.

The roads are excellent. The navigation of the Oka and the Moskwa is a great advantage to this province.

The inhabitants are all of Russian origin; in the city of Moscow itself indeed there are not only persons from all parts of the Russian empire, but strangers from the remotest countries of Asia and Europe. The Russians are of the Greek religion, of which there are in this province above 1300 churches, under the archbishop of Moscow. The Roman Catholics, Lutherans, and Calvinists have churches in Moscow.

MOSCOW (in Russian, MOSKWA), the antient and original capital of the Russian empire, formerly the residence of the czars, till Peter the Great made St. Petersburg the seat of government, is, in comparison with other capitals, a city of modern origin. On comparing all the authorities, it seems most probable that it was founded in 1147, by the grand-duke Yury II., or George, surnamed Dolgorucky, or Long-hand. Thus nearly seven centuries have elapsed since the foundation of Moscow, during which period it has suffered very severely from invasion and fire.

Moscow is situated in 55° 45′ 45″ N. lat. and 37° 33′ E. long., in a fertile and richly cultivated country on the banks of the river Moskwa (pronounced Moskva) and of the rivulets Yausa and Neglina (or Neglinnaya), the latter of which is in fact only a brook. The form of the city is a sort of irregular rhomboid, and its circumference is generally stated at about 25½ English miles. In this space however there are above 1000 gardens, besides 235 kitchen-gardens, some of them of very great extent, and a number of fields or parks called Poles, which are unenclosed fields used for promenades, for holding festivals, and for exercising troops; there are likewise 253 ponds or small lakes, on the banks of some of which there are public walks and fine gardens laid out with much taste.

Moscow is divided into—1. The central part, containing the Kremle or Kremlin. 2. The Kitai-Gorod or Chinese town. 3. The Beloi-Gorod, or white town, surrounding the central part. These divisions lie on the north or convex side of the Moskwa, like a crescent. 4. The Zemlianoi-Gorod, or earthen town, so called from the earthen ramparts with which it is surrounded. This part encloses the preceding parts on the north side of the river, but extends to the south side, so as to fill up the circle. 5. The Slobodi, or suburbs, which are 35 in number.

The view of Moscow at a distance has excited the admiration of all travellers. The countless number of towers, some with cupolas either gilt or painted green, and others rising in the form of minarets, and the many gardens and trees intermixed with the houses, give the city quite an Oriental appearance. The number of towers in Moscow is said to be 600, nearly every church having several, besides the steeple. They have in general, like most Russian churches, a peculiar appearance, being surmounted with what we have called cupolas or domes, but which the Russians call glavas or heads, which are in the form of a bulb or onion, not unlike those of the Pavilion at Brighton; on the top is a crescent, with the cross above it. With a general similarity of appearance, the forms of the towers vary considerably, striking the eye by the irregularity of their forms and their gay diversity of colours. It is to these towers in particular that Moscow owes its remarkable appearance. They are all of stone, and most of them situated in open squares, in consequence of which they escaped the fire of 1812. Hence Moscow has lost little or nothing of its original aspect by that fire, especially as the part of the Kremlin which was blown up by order of Napoleon has been rebuilt in the same style. The roofs of the houses are composed of iron plates, painted dark green, so that at a distance they are lost among the tall groups of trees which rise from the gardens. The gilded cupolas are in general relieved by the green background. The best view of the city is from the Ivan Velikii, or great tower of Ivan in the Kremlin, which is in the centre of the city. Before we say any more of the present state of the city, it may be as well to revert to the fire, by which so large a portion of it was destroyed during the invasion in 1812. After all that has been said and written on the authors of this dreadful conflagration, it seems now to be generally allowed that it was contrived by the Russians themselves. Count Rostopschin, the governor of Moscow, who was generally looked upon as the author of it, never acknowledged it, and even published, in 1823, a pamphlet which he called 'La Vérité sur l'Incendie de Moscow,' in which he positively denies that he had any share in it. But it must be remembered that the destruction of the city served the Russian cause in two ways: by depriving the French of the immense resources which they would have found there; and by inflaming the passions of the people against the invaders, who were represented as the destroyers of the holy city. Several Russian writers have since partly acknowledged that the Russians were the authors of the fire. The French are unanimous in ascribing it to them; and in fact no motive can be assigned for the destruction of the city by the French, at least before they had plundered it. It is probable that the Russians themselves never considered the burning of Moscow in the same light as the nations of Western Europe. Devastating fires have been common occurrences in the history of Moscow, from its foundation to the beginning of the nineteenth century, and though many accounts of such visitations in the earlier periods are doubtless lost, we have accounts of no fewer than seven conflagrations, which totally destroyed the city, and most of which were the work of foreign invaders. Accordingly we may easily understand why the Russian writers look on the last burning of the capital not as a crisis giving a turn to the course of the war, but as a concomitant event of subordinate importance. Perhaps they consoled themselves with the reflection that it had always risen from its ashes with increased splendour and beauty, as it has in fact done in the present instance. With respect to the extent of the destruction, it appears that Moscow contained nearly 10,000 of what are called numbers or courts, each consisting of a principal house and two or more dependent outbuildings. Of these, about 7000 courts were destroyed. Some say that of 2600 stone houses only 525 escaped, and of 6000 wooden houses only 1797 were left. 'Innumerable palaces,' says Dr. Lyall, 'crowds of noble mansions, and thousands of houses, bazars, shops, and warehouses, containing the wealth and luxuries of the world, the depositories of science, of literature, and taste, the cabinets and galleries, were destroyed. The total loss by fire and the war in the city and government of Moscow was estimated at 321 millions of rubles. The government appointed a commission of indemnity, but several rich individuals did not present any statement of their losses. Thus the loss sustained by the two counts Razumowsky, by Count Apraxin, by Count Boutourlin, whose library, valued at a million, was wholly consumed, and by Countess Rostopschin, amounted in houses and furniture to five millions of rubles. But immense and irreparable as the mass of individual suffering undoubtedly was, the memory of it gradually fades away as the Russians see their venerated city rise with increased beauty from its ruins.' We cannot here trace the rapid progress of renovation and improvement since the year 1815, which has so greatly changed the appearance of Moscow. 'The extraordinary mixture and contrast of magnificent palaces and petty huts, so often noticed by foreigners, though still occurring in a few places, no longer strikes the eye as formerly; Moscow is daily losing its Asiatic features, and assuming the appearance of the capitals of Western Europe. Happily for the lover of venerable antiquity, the Kremlin, which suffered comparatively little, notwithstanding the attempts of the French to blow it up, retains unimpaired its antient irregularity and grandeur.' (Lyall.)

According to the latest detailed account that we have ob-

tained, Moscow contained in 1835 above 10,000 houses, of which more than 2000 were of stone, seven cathedrals, 21 monasteries, 245 Greek, 2 Roman Catholic, and 3 Protestant, besides 2 English churches, 3 Armenian chapels, and a Turkish mosque. The emperor Alexander had intended to build on the Sparrow Hill a church to our Saviour, and he actually laid the first stone in 1817. This prodigious edifice was to consist of three distinct churches one above the other, and the total height to be 770 feet, but the design has been abandoned by the present emperor, who ordered a large infirmary to be built instead.

I. *The Kremlin.*—The Kremlin, which was first built of stone in 1367, in a commanding situation on the banks of the Moskwa, taken as a whole, is a most singular, beautiful, and magnificent object. It is surrounded with walls from 12 to 16 feet thick, and of different heights, 28, 30, 35, 45, and 50 feet, with battlements, embrasures, numerous towers, and five gates. The palace contains what remains of the antient palace of the Czars, and the new palace, founded in 1743, burned in 1812, rebuilt in 1816, and since that time successively altered and enlarged. It is not remarkable for its architecture or magnificence. The cathedral of the Assumption of the Virgin, founded in 1326, is esteemed the most splendid in Moscow. It is by no means a large edifice compared with the cathedrals of other countries, but the interior is adorned with extraordinary profusion and splendour. Besides numerous paintings, representing events in the life of our Saviour, there are on the walls 249 full-length images, and 2066 half-lengths and heads, of angels, apostles, saints, martyrs, male and female sovereigns, and patriarchs. Many highly venerated relics are preserved in this cathedral. The Russian sovereigns are here crowned and anointed. The cathedral of St. Michael contains the tombs of the Russian sovereigns, the grand-dukes and czars, from the time that Moscow became the capital till the death of Peter the Great, and, besides those of many male members of the imperial family (the females are deposited elsewhere), that of Peter II. The cathedral of the Annunciation is smaller than the preceding, but built in better taste, and being splendidly ornamented, is a pleasing and magnificent object, forming as it were a wing to the palace. The cathedral of the Transfiguration is a very plain and nearly square edifice, founded in 1328, and rebuilt in 1527. Including the cathedrals, there are 32 churches in the Kremlin.

After the cathedrals, the Ivanovskaya belfry claims attention for its size, its elegance, and magnificent appearance. When the French took Moscow in 1812, they blew up the whole of this belfry, which was laid in ruins, except the tower called Ivan Velikii, which was rent from top to bottom and otherwise injured. Napoleon caused the cross, which was highly venerated by the Russians, to be taken down, intending to place it as a trophy on a church in Paris, but it was left behind in the retreat. The belfry has been entirely rebuilt nearly in the same style as before, but it is now more beautiful and splendid. This tower is 269 feet 6 inches high from the bottom to the top of the cross, which is 18 feet 8 inches. Besides many other bells, there is in this belfry the celebrated bell said to be the largest in the world. It was cast in 1736, but fell in consequence of a fire in 1737, and is now sunk by its weight to some depth in the ground. It has been said to weigh 480,000 lbs., but an inscription states the weight at 10,000 poods, or 360,000 lbs. English. The Kremlin contains likewise the imperial museum, the arsenal, the palace of the patriarch, the Chadof monastery, and the Vosnesenskoi nunnery, in the cathedral belonging to which a great number of grand-duchesses and empresses are interred. It now contains the crowns, sceptres, thrones, arms, and drinking-vessels of the grand-dukes and czars, forming a collection partly valuable for antiquity and workmanship, and partly for the jewels with which the several articles are adorned. The value is said to exceed even that of the treasures in the Jewel-office of London.

II. The *Kitai-Gorod*, surrounded by a wall with 12 towers and 5 gates, is properly the city. The houses, which are mostly of stone or brick, are built close to each other, contrary to the usual mode. It is the centre of the trade of Moscow; and contains the bazars, the magazines, and the richest shops. Among the public buildings are—1, the Pokrovskoi cathedral, built in 1554, which was originally so constructed as to have nine separate churches or chapels, to which eleven more have been since added, so that there are now twenty-one places of worship joined together, in which divine service may be performed at the same time. 2. The house of the town council, a handsome edifice, formerly the university. 3. The printing-office of the holy synod, a very fine building, in which there are thirty presses for printing ecclesiastical books in Slavonian, and books in Greek, Latin, French, and German, for the spiritual schools under the synod. The Kitai-Gorod contains the splendid monument erected by the emperor Alexander in honour of Minin and Pogarskii, who delivered the country from usurpers and foreign invaders in the seventeenth century, and placed on the throne Michael Romanof, the first sovereign of the reigning family. This monument consists of the colossal bronze statues of the two heroes, fourteen feet high, on a pedestal of a single block of red granite, adorned with bas-reliefs. It was designed by M. Martos, an eminent Russian artist.

III. The *Beloi-Gorod*, or white town, the third grand division of the city, forms above two-thirds of a circle, enclosing the Kremlin and Kitai-Gorod on the north side of the Moskwa river, which forms the southern boundary of these divisions. Besides many fine palaces of the nobility, the Beloi-Gorod contains several remarkable edifices, such as the university, the medico-chirurgical academy, the foundling-hospital, the post-office, college of foreign affairs (which might be called the state-paper office), the residence of the governor-general, the exercise-house, the assembly-rooms of the nobility, three monasteries, three nunneries, and numerous churches. The palace of the governor stands in a fine elevated situation, and is a princely edifice of three immense stories, besides the basement, in a simple style of architecture. The internal arrangement, the size and elegance of the apartments, as well as the rich furniture and decorations, correspond with the external magnificence of the building. The university suffered severely in consequence of the French invasion, before which it was very flourishing. The fine library, and valuable collection of all kinds, fell a prey to the flames. The building has since been repaired, and great exertions made to replace the collections. The number of professors and students has varied very considerably; there were in the years

	Professors and Masters.	Students.
1808	49	135
1824	59	820
1830	79	754
1831	78	814
1832	78	719
1833	117	531
1834	168	456
1835	120	419

The exercise-house, an enormous edifice, was built in 1817. In Russia, where the cold in winter is so severe, and the heat in summer frequently so intense, the inconvenience and sometimes the impossibility of training and exercising troops out of doors render such buildings as this absolutely necessary. The government has therefore provided both the capitals and some of the chief towns with these edifices. This at Moscow is, we believe, the largest in Russia. It has two fronts precisely similar, and two similar ends. The length of each front is 560 feet, and the breadth of each end 168 feet; the height is 43 feet. Each front has 32 and each end 8 plain Ionic columns, with fine arched windows between, the frames of which, and the doors of oak, not painted, make an agreeable contrast with the white walls. In this building 2000 infantry and 1000 cavalry may be exercised at the same time. It was designed by Lieutenant-General Betancourt, and the execution of the plan superintended by General Charbonnier. The roof rests entirely on the walls. The foundling-hospital, founded in 1763, is an immense quadrangle, four stories high, besides the basement. It is situated on the north elevated bank of the Moskwa, and on the west side of the Yausa. It is a very plain and inelegant edifice. It is said that it has been productive of great benefit in Moscow in preventing the crime of infanticide, which was very prevalent in Moscow, where that and the barbarous practice of exposing children are now unknown. It is to be regretted that no lists of the mortality are published. Storch could procure none. Dr. Lyall could only obtain a Report, dated January, 1819, from which it appeared that the number of foundlings out of the hospital was 7642, and in the hospital 1138—in all 8780; that

in the preceding year 4340 had been received, being an average of very nearly 12 in a day. The assembly-house of the nobility is a large pile of building, or rather a number of buildings, the effect of which is not agreeable. The interior is fitted up with great splendour: the grand hall is large enough to contain 2000 persons. It was burnt in 1812, and has since been rebuilt: the emperor contributed 100,000 rubles. The palace of General Apraxin far exceeds in length any other private edifice in Moscow; it was almost totally consumed in 1812, but was rebuilt with remarkable rapidity. The palace of Pashkof is reckoned one of the finest specimens of architecture in Moscow. The college of mines, the college of foreign affairs, containing an immense mass of valuable state papers, perfectly well arranged, among which are several English state papers, splendidly ornamented, from 1557 (Philip and Mary) to 1663 (Charles II.), the post-office, and the house of the Bible Society, are more remarkable for their use than for their style of architecture. Several of the churches and monasteries are worthy of notice.

IV. The *Zemlianoi-Gorod*, or earthen town, was so called from the earthen rampart, which was erected in 1618; but of which, though it was repaired in 1783, not a trace now remains. This rampart, forming a pretty regular circle, enclosed the four divisions of the city. In its place there are promenades planted with trees. In this division are the dépôt of the commissariat, a handsome building, consisting of a large central structure three stories high, adorned with Doric columns, with a balcony at their base, and two wings. The dépôt for spirits, which occupies an immense space forming two squares, is chiefly remarkable for its length and its use, it being the dépôt for the spirits, or votke, made at the distilleries belonging to the crown, and from which all Moscow and the neighbourhood are supplied. The Imperial Philanthropic Society, the Moscow Commercial School (an excellent institution), are plain edifices; the Medico-Chirurgical Academy is a large building three stories high, with a portico of six Doric columns, and has two detached advanced wings. It possesses a very respectable anatomical museum, and a fine collection of specimens from the three kingdoms of nature. The Zatchatersko monastery is a great ornament to this part of the city. This monastery derives its name from the church dedicated to the *Zatchatiyé*, or conception of St. Ann, a handsome building in the Gothic style, the interior of which is very elegant and splendid.

V. The *slobodi*, or suburbs, thirty-five in number, form an immense ellipse, or rather irregular polygon, completely surrounding the Zemlianoi-Gorod. Part of the suburbs, like the Zemlianoi-Gorod, consist of a mixture of stone and wooden houses, intermixed with superb mansions and mean hovels; but many of them are like villages, with much unenclosed pasture, some corn-fields, and waste land. In many parts of this division a stranger might fancy himself as far from Moscow as from London. Many of the monasteries and churches in the suburbs are worthy the attention of visitors. It is to be observed that a Russian monastery occupies a large piece of ground, which is surrounded with high walls, enclosing, besides the monastery, a principal central church, and three, four, five, six, or even more churches. Galitzin Hospital is a very fine building, and a noble institution, founded at the end of the eighteenth century by Prince Galitzin. Sheremetof's Hospital is an extensive, noble, and magnificent edifice, resembling a fine Grecian temple. Count Nicholas Sheremetof, desiring to erect an hospital at Moscow, obtained an ukase of the emperor Alexander in 1803, approving the plan. The sum allotted to the building and support of the establishment was two millions and a half of rubles, which, at that time, might be equal to at least 150,000*l.* sterling. The count died in 1809, and the institution was opened in 1810 with 180 beds. His son added 40 beds more. Since that time further additions have been made. The establishment is not merely for the relief of the sick: a large annual sum is assigned for other charitable purposes, such as giving portions to twenty-five female orphans, allowing pensions to fifty indigent females, &c. There are many other hospitals and infirmaries. The chief military hospital is an immense establishment, founded by Peter the Great, and capable of receiving 1500 patients. A fine building, now called Catharine's Barracks, was a magnificent palace, built by the empress Catharine II. It was converted into barracks by the emperor Paul.

Moscow is the residence of two archbishops, and contains, besides the several government offices and public institutions specified in this article, the most important manufactories in the empire. It is the centre of the whole internal trade, and is the depository of immense quantities of merchandise of every description. The value of articles imported here amounts to five millions of rubles in a year. It is also the residence of the great Russian nobles, who live here, especially in the winter. On the whole, Moscow is one of the richest and most magnificent cities in the world, and that in which the national manners and the character of the people have been least changed. The population, which has been variously stated, is supposed to amount to 340,000, including the military (25,000); in the winter this number is increased by 50,000 or 60,000 more.

(Lyall, *History of Moscow;* Hassel; Hörschelmann; Erman, *Reise*, vol. i., 1833; Humboldt, Ehrenberg, and Rose, *Reise nach dem Ural*, &c., vol. i., 1837; Krusenstern, *Précis du Système de l'Instruction publique en Russie*, 8vo., 1837.)

P.S. Since the above was written, we have seen a letter from Moscow, dated the 1st of August, stating that the emperor has caused the antient palace of the Czars to be thoroughly repaired, gilded within and without, and furnished as nearly as possible conformably to antient chronicles and traditions: he has caused the palace of Alexander, after scarcely twenty years' existence, to be levelled with the ground, and a new palace of immense dimensions to be commenced opposite to the old palace of the Czars, which is to form a part of it. As many thousand workmen are constantly employed, it is probable that the work will soon be completed. Another gigantic work is the building of a magnificent church for all Russia, instead of that which the emperor Alexander intended to erect on the Sparrow hill.

MOSELLE, an important river belonging to the system of the Rhine, which has the upper part of its course in France, and the lower on the border of Luxembourg, and in the Rhenish provinces of Prussia. The Moselle rises on the western slopes of the Vosges, near the southern extremity of that range, at an elevation of 372 French toises, or about 2380 English feet, above the level of the sea. At first its course is in the mountainous tract occupied by the ramifications of the Vosges; but at Charmes, below Epinal, it enters the great plain of Lorraine, which is wholly watered by this river and its tributaries, of which the principal are the Meurthe and the Seille, both on the right bank. The course of the Moselle is at first north-north-west for 87 miles to Toul: from Toul it flows north-east in a winding channel of 17 miles to the junction of the Meurthe, where the navigation commences. From the junction of the Meurthe it flows north, or north by east, 56 miles, till it quits France, and, after skirting Luxembourg, enters the Prussian territory. After leaving France it flows 118 miles in a winding channel north-east past Trêves, Berncastel, and Trarbach, to its junction with the Rhine at Coblenz. In the Prussian territories it receives its principal tributary, the Sarre, which is partly a French river. The whole course of the Moselle is about 280 miles, for 170 or 180 of which it is navigable.

The Moselle is subject to frequent inundations, which cause considerable damage. It is used for floating timber for 85 miles above the junction of the Meurthe. The navigation, especially in the French part of the river, is subject to considerable difficulties; in some parts, from the rocks which straiten the channel; in others, from the shallows produced by too great an expansion of the waters: with all these impediments however it serves as the outlet for the produce of a considerable district, especially for timber and deals, charcoal, pit-coal, freestone, slate, corn, wine, and manufactured goods.

MOSELLE, a department of France, on the north-eastern frontier; bounded on the north and north-east by the grand-duchy of Luxembourg and the Rhenish provinces of Prussia, on the south-east by the department of Bas Rhin, on the south by that of Meurthe, and on the west by that of Meuse. Its form is that of an irregular oblong, having its greatest length from west by north to east by south, from near Longuion, on the Chiers, to the neighbourhood of Bitche, amid the slopes of the Vosges, 104 miles; and its greatest breadth, at right angles to the length, from the bank of the Seille, below Nomeny (Meurthe), to the neighbourhood of Sierk, on the Moselle, 41 miles. It lies

between 48° 55′ and 49° 33′ N. lat., and between 5° 28′ and 7° 43′ E. longitude.

The area of the department is estimated at 2063 square miles, which is considerably below the average area of the French departments, and is a little greater than the area of the English county of Norfolk. The population in 1831 was 417,003; in 1836 it was 427,250, showing an increase in five years of 10,247, or about 2·5 per cent., and giving 207 inhabitants to a square mile. In amount and density of population the department is considerably above the average of France, and in both respects rather above the English county with which we have compared it. Metz, the capital, is in 49° 6′ N. lat. and 6° 12′ E. long., 172 miles in a direct line east by north of Paris, or 191 miles by the road through Châlons-sur-Marne and Verdun.

The highlands of the department are at the extremities. The eastern extremity is traversed by the chain of the Vosges, and the western by the heights of Ardennes, which are not so elevated as the Vosges. The intermediate part belongs to the broad valley, or rather plain, of Lorraine, which is watered by the Moselle and its tributaries. The Vosges consist in this department not of the primitive rocks, but of the formations which overlie them, to the new red or saliferous sandstone inclusive. The rest of the department is occupied by the formations superior to those, and which intervene between the red-sandstone and the chalk. The minerals are iron, the ores of which are found in every part, but not always in sufficient quantity to make them worth working; copper and lead, the mines of which have been abandoned: coal; rock salt, in which some mines are wrought; manganese; abundance of gypsum; excellent freestone; together with sandstone, quartz, limestone, potters' earth, and crucible clay. The principal mines of iron-ore are in the arrondissements of Briey and Thionville. There are in the department eighteen establishments for working iron: in these establishments are fifteen furnaces for making pig-iron, in eleven of which charcoal alone is used; in four, charcoal mixed with coke or other fuel; sixty-nine forges for making wrought-iron; and three for the manufacture of steel. There is one coal-pit in the department, which, a few years since, gave employment to 160 or 170 persons, three-fourths of them in the mine, and produced annually nearly 900 tons of ordinary coal: in 1835 the produce rose to more than 3000 tons.

The department is included almost entirely in the basin of the Moselle: a few of the streams which rise on the eastern slopes of the Vosges, and flow immediately into the Rhine, have their sources just within the eastern boundary of the department; and the Chiers, and its tributary the Crune, which belong to the system of the Meuse, water the western part. The Moselle enters the department on the south, near Pont-à-Mousson, and flows northward, 41 miles through the department, by Metz, Thionville, and Sierk. It is navigable in all this part. The Sarre, the principal tributary of the Moselle, enters the department on the south side, but soon after quits it for the department of Bas Rhin; and entering again, crosses the department into the Prussian territory, but at a considerable distance to the eastward of the Moselle. The navigation of the Sarre commences soon after it passes the southern boundary, at the junction of the Albe, which also belongs in great degree to this department. Two other tributaries of the Sarre, the Rossel and the Nied, which latter is formed by the junction of two streams, called respectively Nied Française and Nied Allemande, belong almost entirely to this department; also the Ornes, a feeder of the Moselle. The Seille, which joins the Moselle at Metz, has the greater part of its course in the department of Meurthe. The navigation of the Moselle is given in the official accounts at 50 miles; that of the Sarre, at 22 miles. The Canal des Salines, which was formed to convey the produce of the salt-works of Meurthe to the Sarre, has part of its course in this department. It follows the valley, first of the Rode, a small feeder of the Albe, and then of the Albe itself till its junction with the Sarre. There are a considerable number of pools or small lakes, and some marshes.

The number of Routes Royales, or government roads, is twelve; their aggregate length (Jan. 1, 1837) was 276 miles, viz. 231 miles in repair, 26 miles out of repair, and 19 miles unfinished. The principal road is that from Paris to Metz, and from thence onward into the Prussian and other German states. It enters the department on the south-west side, and runs first east, and then east-north-east, by Metz, Sarreguemines, Hombourg, and Forbach. The road from Paris to Luxembourg crosses the western side of the department through Longuion and Longwy. Roads run from Metz to Longwy, with a branch to Thionville; to Sarrelouis in the Prussian states; to Nancy and to Château Salins, in the department of Meurthe. There are roads from Sarreguemines by Château Salins to Nancy, by Saar Union (Bas Rhin) to Phalsbourg (Meurthe), and Strasbourg (Bas Rhin); and to Sarrebruck, in the Prussian territory. The Routes Départementales, or departmental roads, had (Jan. 1, 1837) an aggregate length of 216 miles, viz. 182 in repair and 34 out of repair. The aggregate length of the bye-roads and paths (chemins vicinaux) was above 3000 miles. In the means of communication, both by land and water, this department is better provided than the French departments generally are.

The temperature of the department varies with the elevation of the surface: in the plain of the Moselle it is mild; in the hilly and mountainous tracts the cold is of longer duration and more severe. In the neighbourhood of Sarreguemines and of Bitche, amid the Vosges, the snow lies long on the ground, and the transition from winter to summer is very rapid. Agriculture is better understood and practised in this department than in most parts of France, and the peasantry are distinguished by their activity and superior knowledge. Fallows are gradually passing into disuse; and the employment of marl, and especially gypsum, as manure, is common. About 750,000 acres, nearly three-fifths of the whole surface, are under the plough. The quantity of wheat raised exceeds by a third the average produce of the French departments; and in barley, oats, rye, and maslin (or mixed corn), the preponderance is about the same; but from the number of horses, the supply of oats is not sufficient to meet the demand. A considerable quantity of pulse is grown; also of flax and hemp; and of linseed, rape, and colza, from which abundance of oil is produced. Potatoes are cultivated, but not so extensively as in other parts; maize is little grown, and buckwheat not at all. About 30,000 acres are occupied as orchards or gardens, especially the former; and some villages are so surrounded by orchards, that they appear as if built in a wood. The melons, peaches, pears, and especially the Mirabelle plums of Metz, are in high repute. The drying of the fruit, and the preparation of confectionary and syrups from them, is an important branch of industry. The nursery-grounds of the department are in high repute, and young trees are sent to a considerable distance. The vineyards occupy about 13,000 acres. The wine is chiefly of middling quality, the vignerons (vine-dressers) finding their account in the production of a large quantity of ordinary wine, from the hardy Lorraine grape, rather than in the uncertain vintage of grapes which, though they produce better wine, are less able to withstand the frosts of winter and spring. Some of the growths are however fine, and are sent into Germany; the commoner sorts are consumed at home. The quantity of woodland is considerable, about 230,000 acres, and affords a supply of fuel for domestic use, and for the iron and other works: the trees are chiefly, oak, beech and hazel: a considerable trade is carried on in walkingsticks, made from the thorn and the cornel.

The meadow-land amounts to 110,000 or 120,000 acres: a small portion of it is devoted to the cultivation of the artificial grasses. The number of horses is more than twice as great as in the average of the departments, but they are of a very ordinary breed. The number of horned cattle is rather above the average; but they are of small size, and do not readily fatten. The number of sheep is comparatively small, and the breed for the most part very inferior. Considerable efforts have however been made of late years for its improvement: the Merinos have been introduced on the model farm of Moncey, in the arrondissement of Briey; and the English breeds and the Cashmere goat in some other establishments. Swine are numerous; their flesh affords a substitute for the deficient supply of beef. Bees are pretty extensively kept.

The forests abound with game: the wild boar is rarely found; but the roebuck and the hare, as well as the wolf, the fox, and wild cats, are common. Redbreasts abound in the neighbourhood of Metz, where they are taken in autumn in great numbers, being esteemed a delicacy. The rivers abound with fish; the Sarre and the Moselle yield

the salmon and the shad, which ascend them thus far: the crayfish of the Sarre are excellent.

The department is divided into four arrondissements as follows:—

		Area in sq. Miles.	Population in 1831.	1836.	No. of Communes.
Metz,	S.	622	150,840	150,811	218
Thionville,	N.	405	83,227	87,520	117
Briey,	W.	459	60,297	62,946	126
Sarreguemines,	E.	577	122,639	125,973	143
		2063	417,003	427,250	604

The number of cantons or districts, each under a justice of the peace, is twenty-seven.

In the arrondissement of Metz are—Metz (pop. in 1831, 44,416 for the commune; in 1836, 42,793), on the Moselle; Gorze (pop. 1740 town, 1781 commune), at some distance from the left bank of that river; Boulay (pop. 2643 town, 2689 whole commune), near the Nied; and Faulquemont, on the Nied Allemande. Gorze is in a narrow valley of the most picturesque character. It has several fountains, supplied by springs in the town. There are several tan-yards at Gorze. There are the ruins of an old abbey, and of the abbot's house; also of some subterranean conduits of Roman erection, which convey the waters of this neighbourhood to the aqueduct which ran from the neighbourhood of the Roman fortress of Arx (now Ars-sur-Moselle) across the Meuse, and then to Divodurum (now Metz), where it furnished a supply of water to the baths and naumachia. Of this aqueduct there are considerable remains, partly in the bed of the Moselle, and partly on the right bank, near the village of Jouy: the foundation of it is ascribed to Drusus by antiquaries, but the popular name is the Devil's Bridge. At the village of Ars, just mentioned, are two paper-mills, a manufactory of velvet, and one of woollen cloth for clothing the troops. Boulay has considerable manufactures of swords and bright steel weapons; of saws, anvils, and all kinds of joiners' and locksmiths' tools; of cotton yarn and woollen cloths; of copperas, alum, soap, and glue. There are also breweries, lime-kilns, fulling-mills, oil-mills, dye-houses, and tan-yards, besides a mill for grinding plaster, and two mills for grinding cutlery and tools.

In the arrondissement of Thionville are—Thionville (pop. in 1831, 4142 town, 5645 whole commune; in 1836, 5680 for the commune) and Sierk (pop. 1624 town, 2028 whole commune), on the Moselle; Rodemarck, a short distance from the left bank of that river; and Bouzonville (pop. 1817 town, 2325 whole commune), on the Nied. Thionville was probably founded in the eighth century. It was fortified by the Spaniards, from whom it was taken by the Prince of Condé, after the great battle of Rocroy, A.D. 1649. It is a fortress of some strength, on the left bank of the river, and was vainly besieged by the Prussians in A.D. 1792. It has an old wooden bridge remarkable for the facility with which it can be taken down. There are in the place several potteries and brewhouses, two corn-mills, two bark-mills, and an oil-press. There is a school of mutual instruction; courses of instruction are given in geometry and mechanics applied to the arts.

Sierk is situated at the foot of a rocky eminence, crowned by a fortress. This place has several tan-yards; glue is made, and stones for oil-mills and presses are cut from one piece. The stone with which Metz is paved is quarried near this town. Sierk is the mart for the hardwares and laces of the duchy of Berg, the silks of Crevelt, the needles of Aix-la-Chapelle, and the copper wares of Stolberg. There is a custom-house (the town being close on the frontier), the revenue collected at which is above 50,000*l.* per annum.

At Bouzonville are corn-mills and oil-presses, several tan-yards, glue manufactories, and cabinet-makers' shops; a brewery, and two lime-kilns. There are a school for mutual instruction and an outline drawing-school. At Cattenom, a village between Thionville and Sierk, is held the principal cattle-fair of this district, and at Hayange, Moyeuvre Grande, and other villages in the neighbourhood of Thionville, are the vast iron-works established by the late M. Wendel, for the preparation of iron by the English methods.

In the arrondissement of Briey are—Briey (pop. in 1831, 1755 commune; in 1831, 1730), on the Woigot, or Voigot, a small feeder of the Ornes and Longwy (pop. 2483), and Longuion or Longwyon (pop. 1612), on or near the Chiers. Briey consists of several narrow streets on the slope of a steep hill, and commands the prospect of a pleasant valley, well wooded and watered. Longwy consists of two parts, the upper and lower town. The upper town is on a rock, and was fortified by Vauban. In the lower town there was antiently a fortress, on the site of which Roman medals have been dug up. It has been supposed that the town occupies the site of a Roman camp. The principal square is large and regularly formed; the principal public buildings are the town-hall and the hospital. The inhabitants have an oil-press and a brewery: they manufacture earthenware from pipe-clay, and trade in hams and bacon. Longwy was besieged by the Prussians in 1815, and though garrisoned only by 200 soldiers, was not taken without the loss of 3000 men. There is a school of mutual instruction.

In the arrondissement of Sarreguemines are—Sarreguemines (pop. in 1831, 4142 town, 4189 whole commune; in 1836, 4113 for the commune) and Sarralbe (pop. 2302 town, 3544 whole commune), on the Sarre; Morhange, near the Rotte, which flows into the Nied Française; Petelange, or Puttelange (pop. 1797 town, 2290 whole commune), on a feeder of the Albe; St. Avold (pop. 3298 town, 3451 whole commune) and Hombourg, on the Rossel; Forbach (pop. 2958 town, 4281 whole commune), between the Rossel and the Sarre; and Bitche (pop. 2867 town, 3132 whole commune), amid the slopes of the Vosges. Sarreguemines is a well built town; its principal street leads to the bridge over the Sarre. There are considerable potteries here, in which earthenwares of every quality are manufactured, and sent to Paris, Strasbourg, Nancy, and other places. Admirable imitations of the Etruscan vases, and an artificial porphyry of great beauty, are made here. Snuff-boxes of papier-maché are made round this town to the yearly value of more than 30,000*l.* There are several corn-mills and breweries, a bark-mill and a tile-kiln. There is a high school at Sarreguemines. Sarralbe derives its name from its situation at the confluence of the Sarre and the Albe. The inhabitants manufacture linen; the weavers work, not in factories, but, as in Ireland, in their own houses. Near the town are salt-works which furnish annually 900 to 1000 tons of salt. Near St. Avold are several flour-mills and a tile-kiln. Bitche is built at the foot of a rock of red-sandstone, on which is situated a fortress deemed impregnable. The ascent to the fortress up the face of the rock is very steep, and the whole interior of the rock is vaulted and formed into casemates. There is a well dug in the rock 270 feet deep and protected by a bomb-proof covering. There are in the town an hospital, a small barrack, and three public walks; it is surrounded by a wall with battlements. In the war of 1792-3 the Prussians attempted in vain to surprise the fortress of Bitche. Several of the villages in the country round Bitche are the seat of considerable manufactures; the iron-works of Monterhausen employ 400 workmen; and at the glass-works of Maisenthal and Goetzenbruck, watch and clock glasses, to the annual value of 8000*l.*, are manufactured; and the flint-glass works of Munsthal produce goods to the yearly value of 24,000*l.* or 25,000*l.*

The manufactures of the department are various and important. Cloth, especially for army clothing, flannel, and various other woollen fabrics; linens, calicoes, velvet, silk neckerchiefs, and other silk goods, hats, paper, and snuff-boxes are made. Beside the works for making pig or wrought iron, there are factories for making iron goods, as nails, saw-plates, files, rasps, and other tools, and steel ornaments. There are several glass-works, potteries, tan-yards, breweries, and brandy distilleries; many kilns for lime and gypsum, and mills for pulverising the latter. About 800 women are employed in embroidery and tambour-working. The exports consist of the productions of these several works, wine, wool, timber, preserved fruits, liqueurs, honey, hams, and bacon.

The department constitutes the bishopric of Metz, the bishop of which is a suffragan of the archbishop of Besançon. It is in the jurisdiction of the Cour Royale and the circuit of the Académie Universitaire of Metz; and in the third military division, of which the head-quarters are at Metz. It returns six members to the Chamber of Deputies.

In respect of education this department is considerably in advance of the average of the French departments; but is

inferior to the adjacent departments of Meuse, Meurthe, and Bas Rhin. Of every 100 young men enrolled in the military census for 1828-29, 57 could read and write. The number in the other departments was, Meuse 74, Meurthe 68, Bas Rhin 62; average of France 39.

This department antiently constituted part of the territory of the Mediomatrici, whose capital was Divodurum, afterwards Mediomatrici or Mettis, now Metz, and of the territory of the Verodunensos and the Treveri or Treviri. These people were, in the Roman division of Gaul, comprehended in the province of Belgica Prima. The Romans called the Moselle, Mosella (*i.e.* the little Meuse, a diminutive of Mosa, the Meuse), and the Sarre, Saravus. In the territories of the Mediomatrici, beside Divodurum, were—the town of Ibliodurum, which D'Anville fixes on the river Yron, on the border of this department and that of Meuse; Caranusca, somewhere near Thionville; and Ad Duodecimum, on the border of this department and that of Meurthe. There do not appear to have been any other Roman or Gallic towns mentioned by antient authors within the boundary. From the Romans the department passed to the Franks; in the middle ages it was known as part of the country of Les Trois Evêchés; and before the Revolution was included in the province of Lorraine.

MOSES (מֹשֶׁה, Μωυσῆς, Μωσῆς), the lawgiver of the Hebrew people, was an Israelite of the tribe of Levi, and the son of Amram and Jochebed (*Exod.*, ii. 1; vi. 20). He was born in Egypt, in the year 1571 B.C., according to the common chronology. To evade the edict of Pharaoh, the king of Egypt, that all the male children of the Hebrews should be killed (*Exod.*, i. 22), he was hid by his mother three months, and then exposed in an ark of rushes on the banks of the Nile. Here the child was found by Pharaoh's daughter, who adopted him for her son, entrusting him to his own mother to nurse, by which circumstance he was preserved from being entirely separated from his own people. He was probably educated at the Egyptian court, where he became 'learned in all the wisdom of the Egyptians.' (*Exod.*, ii. 1-10; *Acts*, vii. 20-22; *Heb.*, xi. 23.) At the age of forty years Moses conceived the idea of freeing his Hebrew brethren from their bondage in Egypt, and on one occasion, seeing an Egyptian (probably some officer) maltreating an Israelite, he interfered, slew the Egyptian, and buried him in the sand. The next day, upon his attempting to reconcile two Hebrews who had quarrelled, his services were scornfully rejected, and he was upbraided with the murder of the Egyptian. Finding that his secret was known, he fled from Egypt, and took refuge with a tribe of Midianites in Arabia Petræa [MIDIANITES], among whom he lived as a shepherd forty years, having married the daughter of their priest Jethro or Reuel. (*Exod.*, ii. 11-22; *Acts*, vii. 23-30; *Heb.*, xi. 24-27.)

As Moses fed his father-in-law's flocks in the desert of Sinai, God appeared to him at Mount Horeb in a bush which burnt with fire, but was not consumed—an emblem of the state of the Israelites—and commanded him to return to Egypt and lead out his people thence into the land of Canaan. His elder brother Aaron was joined with Moses in this mission, and the power of working certain miracles was conferred upon him. On his arrival in Egypt, the Israelites accepted him as their deliverer, and after bringing ten miraculous plagues upon the land of Egypt before he could gain Pharaoh's consent to the departure of the people, he led them out through the Red Sea, which was miraculously divided for their passage, into the peninsula of Sinai. (*Exod.*, iii., xv.) [EXODUS; JEWS.] While the people were encamped at the foot of Sinai, God delivered to them, through Moses, the law which, with some additions and alterations, was ever after observed as their national code. (*Exod.*, xx.) After leading the Israelites through the wilderness for forty years [JEWS], Moses appointed Joshua as his successor in the command over them, and died at the age of 120 years, on Mount Pisgah, on the east side of the river Jordan, having first been permitted to view the land of Canaan from its summit. God buried him in the valley of Bethpeor in the land of Moab, but his tomb was never made known. (*Deut.*, xxxiv.; *Jude*, v. 9.)

The following points in the history of Moses require further explanation.

1. The name of Moses (מֹשֶׁה) was given him by the Egyptian princess, 'because,' she said, 'I *drew him out* (משיתהו from משה *to draw out*) of the water.' (*Exod.*, ii. 10.) Now, under the circumstances of the case, the name is much more likely to be Egyptian than Hebrew, and its real derivation is probably that given by Jablonsky (*Opuscula*, i. 152-7), from the Coptic *Mo*, 'water,' and *Oudsche*, 'saved.' This is confirmed by the form Μωυσῆς, which is always used in the Septuagint, and by the testimony of Josephus (*Antiq.*, ii. 9, 6) and Philo (*De Vita Mosis*, ii. 83).

2. The gap left by the Scripture narrative in the early history of Moses has been filled up by Josephus, Philo, and other writers, with various legends, some of them highly improbable, of which an outline is given in Milman's *History of the Jews*, vol. i., p. 61, &c.

3. The miracles of Moses have been made the subject of much discussion, and many divines of the Rationalist school have attempted to explain them as an advantage cleverly taken of natural phenomena, or as ingenious jugglery. Even if it were admitted that most of the ten plagues were visitations to which Egypt was subject, they would still retain all the essential characters of miracles in their increased extent and the unusual time of their occurrence, in the exemption of the Israelites in Goshen from most of them, and in their immediate cessation at the prayer of Moses. The imitation of the first three plagues by the Egyptian magicians has generally been ascribed by Jewish and some antient Christian writers to diabolical agency, and some modern writers have considered that it can be satisfactorily accounted for by the known skill of the Egyptian priests in legerdemain. But assuredly their inability to imitate the later plagues, when they confessed, 'This is the finger of God' (*Exod.*, viii. 18, 19), is a much stronger argument for the miraculous character of these visitations, than their imitation of the earlier ones is against it. Several writers have shown how greatly the sufferings of the Egyptians from these plagues were aggravated by their physical circumstances and religious opinions. (Bryant's *Observations upon the Plagues inflicted on the Egyptians*; Rosenmüller's *Scholia, Exod.* vii., &c.; Milman's *History of the Jews*, vol. i., p. 68, &c.) Other difficulties connected with this part of the life of Moses are mentioned under EXODUS, and in Winer's *Biblisches Realwörterbuch*, vol. ii., p. 133-139. Respecting the king of Egypt in whose reign Moses led out the Israelites, and the destruction of the Egyptians in the Red Sea, see Wilkinson's *Manners and Customs of the Antient Egyptians*, vol. i., c. 2, p. 54.

The part which Moses took as leader of the Israelites is stated in the Scripture record to have been owing to the direct command of God (*Exod.*, iii.), and the laws which he gave them are asserted to have emanated from God himself. (*Exod.*, xx. 1, 22, &c.) As the truth of these facts, or, as theologians express it, of the 'Divine Legation of Moses,' depends chiefly on the authority of the books ascribed to Moses, this part of the subject is referred to PENTATEUCH.

The Legislation of Moses.—The chief authority for the following account of the Mosaic legislation is the 'Mosaisches Recht' of Michaelis. The references are to the English translation of that work by Dr. Alexander Smith. Other works on the subject are mentioned at the end of the article.

The Law is laid down in the books of Exodus, Leviticus, and Numbers, and repeated with modifications in the book of Deuteronomy, but in neither case in any systematic order. (*Exod.*, xx.-xxiii., xxv.-xxxi., xxxiv., xxxv.; *Levit.*, i.-viii., xi.-xxv., xxvii.; *Numb.*, v.-x., xviii., xix., xxvii.-xxx.; *Deut.*, iv., &c.)

The Mosaic laws must be viewed throughout as enacted for a people who stood in the peculiar situation of having been chosen by Jehovah out of the nations to preserve the knowledge and worship of the true God, and to exhibit in their history the providential dealings of God with his people.

The whole law rested on two fundamental principles, one of which was religious, and the other partly religious and partly political.

The first fundamental principle of the Mosaic law is the worship of Jehovah as the one true God; and consequently an uncompromising opposition to polytheism and idolatry, which were at that time the prevailing religious errors. Other nations, while acknowledging the supreme God as the creator, associated with him subordinate deities, to whose agency they looked for temporal blessings. All such

worship was prohibited by the first words of the Law, 'I am Jehovah, thy God, which brought thee out of the land of Egypt, out of the house of bondage. Thou shalt have no other Gods *with* me.' (*Exod.*, xx. 2, 3; *Deut.*, iv. 35, 39.) The second commandment is an equally decisive prohibition of idolatry of every kind. (*Exod.*, xx. 4, 6.) To render this fundamental law the more binding, Jehovah, who was already the founder of the nation of Israel by delivering them from Egypt, was represented as their king, with the consent of the people themselves, and thus idolatry became high-treason. (*Exod*, xix. 4-8; *Deut.*, vi. 22-24, xxxiii. 5; 1 *Sam.*, viii. 7; x. 18, 19; xii. 12; 1 *Chron.*, xxix. 23; *Isaiah*, xxxiii. 22.)

The land of Palestine too was represented as the property of God, held under him by the people, who consequently had not the power to alienate it for ever. (*Levit.*, xxv. 23.) This fundamental principle was carried out in the form of government which is commonly called a *theocracy*, that is, a government under the direct superintendence of God. The laws were given by God, and could only be repealed by his command (*Deut.*, iv. 2; xii. 32); the judges were selected usually from the caste of the priests, and are represented as holy persons, sitting in the place of God, to whose decision they submitted difficult cases by means of the Urim and Thummim. (*Deut.*, i. 17; xix. 17.) God often made known his will concerning state affairs through the prophets, of whom a constant succession was promised (*Deut.*, xviii. 15-22); and he promised to reward the people with prosperity if they kept the law, and threatened to punish them with calamity if they broke it. In these particulars the Israelites were distinguished from other nations as being under the more direct government of God; but nevertheless they had a well-defined civil constitution, as we shall presently see.

The second fundamental principle of the Mosaic law is the discouragement of intercourse between the Israelites and other nations. This principle was not carried so far as to prohibit the settlement of foreigners in Palestine, or of Israelites in foreign countries; but both practices were discouraged, and the latter much more than the former. Each man had his hereditary possession in land, which, as he could not sell it, he of course forfeited upon settling in a foreign country; and many of the practices enjoined upon the people were such as could hardly be observed in a strange land. To prevent their indulging in conquest, and thus running the risk of becoming subject to foreign powers, Moses confined them within certain boundaries, and also prohibited their choosing a foreigner as king. (*Deut.*, xvii.)

This state of isolation was well suited to a nation who were sufficiently numerous to people the country assigned to them without the aid of foreigners, and who had neighbours, such as the Sidonians, who were able to conduct their commerce for them. But above all this arrangement was necessary for the preservation of the worship of Jehovah among them, prone as their history proves them to have been to follow the idolatry of the surrounding nations.

The nature of the occupations followed by the citizens of any state affects the whole complexion of its institutions. Among the Israelites, trades do not appear to have been followed to any extent as the means of gaining a livelihood. Mechanical labour was probably left to the slaves, who, in the houses of the wealthy, appear to have carried on extensive manufactures (1 *Chron.*, iv. 21), and to the women (*Prov.*, xxxi.); though in the building of the tabernacle we find some of the more noble mechanical arts practised by freemen. Hence it followed that there were no cities dependent on trade or manufactures, and no separate classes of citizens, or burghers, and peasants. The cities of Palestine were only fortified villages, and most of them appear to have been small.

Neither was commerce the occupation of the Hebrew people. The necessary internal commerce was provided for by the three great feasts, to celebrate which all the men were assembled at Jerusalem thrice a year, and which, in this respect, answered the purpose of modern fairs. But foreign and maritime commerce was not at all encouraged by the Mosaic institutions, many of which tended directly to obstruct it, especially the making each man a landholder and cultivator, and the law against lending money on interest. Besides the example which Moses had before him in the case of Egypt, of a powerful and civilised nation flourishing almost without foreign commerce, he was probably influenced by the following reasons in discouraging it. It would tend to introduce idolatry, to tempt many citizens to leave the country, to foster luxury, and to involve the Israelites in quarrels with other nations; while on the other hand they had all the advantages of commerce within their reach through the Sidonians and the Asiatic trading caravans. In later times Solomon pursued commerce to a great extent, though his seamen were not Israelites, but Phœnicians.

The practice of freebooting to obtain a livelihood, so common among the Arabs, and by no means unknown among their Hebrew brethren (*Judges*, ix., xi.), was discouraged by Moses, both by the allotment of land to every citizen, and by the little encouragement which he gave to hunting.

The real foundation of the Mosaic polity was in agriculture. The whole territory of the state was so divided that every Israelite (that is, every head of a family except those of the tribe of Levi) received a portion of land, which became the inalienable property of himself and his heirs. They had previously been a nomadic people, and a trace of that condition was long after preserved in the extent to which they pursued the breeding of cattle.

This freehold basis, as we may call it, prevented the formation of classes of burghers and nobility. There was no distinction of *caste*, except in the case of the Levites (the descendants of Levi), who were devoted to the offices of religion and learning; but even they could not be said to form a class of nobility, for they had no landed property, but were supported by the tithes of all the land.

In consequence of the equality of the citizens, the *constitution of the republic* had a democratic character. When Moses made known any laws, he called together the whole 'congregation of Israel.' When we consider that the number of adult males was then about 600,000, it becomes probable that those whom Moses addressed on such occasions were certain persons deputed to represent the rest. Such persons are mentioned in *Exod.* xix. 7, 8, and *Numb.* i. 6; and in other passages there are enumerations of the classes of persons of whom these representatives consisted, namely, *elders*, *heads* or *captains of tribes*, *judges*, and *officers* or *scribes*. (*Deut.* xxix. 10; *Josh.* xxiii. 2; xxiv. 1.)

The lowest rank of officers in the republic were the *heads of tribes* and *heads of families*. These orders were a remnant of the patriarchal state, and are still kept up among the Beduin Arabs. Each of the twelve tribes had its chief. (*Numb.* ii.) The tribes were subdivided into greater and lesser families, called *families* and *houses of fathers*, which had their respective heads. (*Numb.* i. 2; *Josh.* vii. 14.) These heads of families are in all probability the persons called *elders* in *Deut.* xix. 12; xxi. 1-19; and *Josh.* xxiii, xxiv. It is uncertain whether the elders were chosen with reference to their age, as the word would seem to denote if it were not constantly used in other languages as a title of office or of honour, without reference to age, as in the Roman *senator*, the Greek πρεσβύτερος, and the Arabic *sheik*. It is equally uncertain in what way the heads or princes of tribes were chosen. The princes of tribes are found as late as the reign of David.

Thus the twelve tribes formed twelve distinct commonwealths, governed by the princes of tribes, and under them by the heads of families; and they sometimes acted as separate states, carrying on war independently of each other, even as late as the time of the kings. (*Josh.* xvii. 11-15; *Judges* iv. 10; xviii.-xx.; 1 *Chron.* iv. 41-43; v. 18-23.) The descendants of Levi were not reckoned among the twelve tribes, but were scattered over the territory of their brethren; and the number of the tribes was made up by the division of the descendants of Joseph into two tribes, which were named after his sons Ephraim and Manasseh. (*Numb.* i.) A certain number of persons appears to have been necessary to constitute tribes and families. (1 *Chron.* xxiii. 11.)

These twelve tribes were united in one republic, which generally, though not always, had a chief magistrate, whether a lawgiver as Moses, or a general as Joshua, or a judge as those whose history is recorded in the book of *Judges*, or a king as Saul and his successors. With regard to the judges however, it is highly probable that some of them ruled not over all Israel, but only over single tribes. The twelve tribes met in general diets (*Josh.* xxiii., xxiv.), and united in war against a common enemy. We have striking instances of the independence of the separate tribes in the fact that David reigned several years over the tribe of

Judah alone; in the revolt of ten of the tribes from Rehoboam; and in the standing rivalry between the tribes of Judah and Joseph, which led to that revolt.

The next rank of officers, the *judges*, did not represent their tribes. Before their appointment Moses was sole judge, and it was to relieve him from the burthen of that office that a class of judges was instituted. (*Exod.* xviii.) There was a judge over every ten persons, another over every hundred, and another over every thousand. From each of these orders there was an appeal to the one above, and from the last to Moses himself. Moses further ordained that when the people were settled in Palestine, judges should be appointed in every city. The choice of them appears to have been left to the people, as Moses lays down no rules for their election. In subsequent ages it generally happened that they were Levites.

In *Numb.* xi. 16, we have an account of the appointment of seventy men out of the elders of the people to assist Moses. These are commonly supposed to have been judges; and the foundation of the Sanhedrim, so well known in the later Jewish history, is traced to their appointment. Michaelis takes a very different, and, we think, more correct view of their office. He considers that they were a senate chosen to take part with Moses in the government, and that the institution was but temporary. We do not find them mentioned in the subsequent history of the people, and the real Sanhedrim was not founded till after the Babylonish captivity.

The *scribes* were an order of officers quite distinct from the judges. This office was instituted during the Egyptian captivity. (*Exod.* v.) They were to be appointed in every city. (*Deut.* xvi. 18.) In the time of the kings they were generally taken, like the judges, from the tribe of Levi. Their name (שׁוֹטְרִים) is derived from a root, which still exists in Arabic (*satar*), meaning *to write*. From this and other circumstances it is concluded that they were the officers who kept the genealogical registers and apportioned the public burdens to every individual. They also conveyed to the people the general's orders in time of war. (*Josh.* i. 10.)

Such was the Israelitish state, consisting of the congregation of the people, governed by the heads of families, the princes of tribes, the judges, and the scribes. To this democratic constitution the tribe of Levi formed a counterpoise. They had no landed property, but received the tithes of all the other tribes. Besides these they received the first fruits of all produce, probably about a sixtieth part of the whole crop; they had a part of every sacrifice; and while the people were in the wilderness every beast killed for food was offered as a sacrifice, and afterwards the priest received a portion of every slaughtered beast that was not brought to the altar; they had everything that was devoted to God, and the redemption fees of the first-born of men and unclean cattle, a share of the spoils taken in war, and some minor articles. A calculation of these items would show that their revenues were enormous, and far more than is needed for the support of a body of religious instructors. But this was not the office of the Levites; and the circumstance of their living in cities of their own made the discharge of such an office impossible. They were indeed, in a different sense, the ministers of religion; for they performed all religious ceremonies, preserved copies of the law, explained it in doubtful cases, and were bound to read it over to the people once every seven years; but a body of religious teachers or *doctors* did not exist till after the Babylonish captivity. The Levites were the *literary class* of the nation, and filled all the learned professions. Difficult questions of law were to be referred to them for judgment. (*Deut.* xvii. 8-13; xxi. 5.) In the wilderness they formed a guard to the tabernacle and to Moses. The occasion of their obtaining the priest's office is related in *Exod.* xxxii. 25-29.

The head of the Levitical order was the high-priest, who was always taken from the family of Aaron. He possessed great influence in the state. He was the supreme legal authority. In *Deut.* xvii. 12, he is placed on a level with the judge or chief magistrate; and when there was no king or judge, the high priest was the chief magistrate, as in the case of Eli.

Moses did not determine what should be the nature of the *supreme magistracy*. Before his own death he appointed a successor in the person of Joshua, who was a *military leader*, and whose office it was to put the people in possession of Palestine. Joshua was succeeded by the *judges* * at intervals of time. The office is mentioned by Moses (*Deut.*, xvii. 12), but he gives no command for the appointment of the judge. The judges seem to have been somewhat analogous to the Carthaginian suffetes. They were not the ordinary and permanent magistrates, but they governed Israel in times of trouble. There was no regular succession of them, and it is by no means clear that all of them governed the whole nation.

The judges were succeeded by *kings*, of whom there was a regular succession from Saul to the Babylonish captivity.

Though Moses evidently desired that the state should remain a free republic under the supreme government of Jehovah, and though when the people actually asked for a king, God, by Samuel, represented their desire as both foolish and sinful (1 *Sam.*, viii.); yet as Moses foresaw that they would wish for a king, in imitation of the surrounding nations, he gave the people power to choose one, and prescribed his duties (*Deut.*, xvii. 14-20). This is one of the many instances in which Moses shows one of the highest qualities of a good legislator, in making the best provisions which the circumstances allowed, instead of attempting to carry out his views of what was best where the character of the people made those views impracticable. The following are the chief laws respecting the king. The election of the king was left to the people (*Deut.*, xvii. 14), with the restriction that he must be an Israelite by birth, not a foreigner (ver. 15); the appointment must be one which had the sanction of God (ver. 15), whose will on this subject was made known through a prophet, as we find from history (1 *Sam.*, ix., x.). He was not to keep a strong body of cavalry, nor a great number of horses (ver. 16). This law was well suited to the physical condition of Palestine, a mountainous country, which could be defended without cavalry, and where the keeping up of such a force could only arise from a spirit of conquest. This, like some others of the Mosaic laws, was disregarded by Solomon, who had an enormous number of horses. The king was forbidden to lead the people back to Egypt (ver. 16), which probably means that he was not to attempt to reconquer the land of Goshen. (Michaelis, vol. i., p. 64-67.) He was not to take many wives, 'that his heart turn not away' (ver. 17), as happened to Solomon, whose wives seduced him to idolatry. Another reason of this law was probably to discourage polygamy by the example of the king. This law was constantly broken by the kings of Israel. He was not to collect excessive quantities of gold and silver (ver. 17). He was to be well acquainted with the law, of which he was to have a copy written out at his accession, which he was to read daily (ver. 18, 19). On his obedience to these commandments depended the continuance of his kingdom (ver. 20). Besides this fundamental law, there was an agreement or covenant between the king and the people, which was sworn to by every king at his accession. (1 *Sam.*, x. 25; Michaelis, *Art.* 55.) The kingly power was therefore not unlimited; but we find that the government of the kings had always a tendency to despotism, which may be ascribed to the want of an hereditary military noblesse, and to the notion which prevailed among the Israelites, in common with other Oriental people, that it was the office of the king in person to be supreme judge. As to the latter point, it certainly was not the intention of Moses that the burden of deciding causes should rest upon the kings, and very mischievous consequences resulted from their assuming the office.

The king had the power of enacting new laws, provided they were not at variance with the fundamental principles of the constitution, and of dispensing with the punishments prescribed by Moses. He had the power of life and death over the priest, even the high-priest; and it was part of his duty to reform abuses in religion. These powers, which are not mentioned in the Mosaic code, are inferred from the constant exercise of them by the kings. Such matters probably formed part of the covenant between the king and people mentioned above. It is uncertain whether he had the right to declare war at his own pleasure.

On the subject of the royal revenues Moses left no ordinance. They consisted of presents (1 *Sam.*, x. 27; xvi. 20), of tithes from all the land (1 *Sam.*, viii. 15), and of a demesne which was probably acquired by confiscations. The kings had a right to demand bond-services of the people

* This supreme magistracy must not be confounded with the ordinary judges mentioned above.

(1 *Sam.*, viii. 12-16; 1 *Kings*, v. 13-18), which at first however were chiefly performed by the Canaanites who remained in the land. In later times a poll-tax was exacted on pressing occasions. They took advantage of the neighbouring Arabian deserts to rear cattle. (1 *Chron.*, xxvii. 29-31.) Solomon derived a considerable revenue from foreign commerce.

The monarchy was hereditary, for the election by the people mentioned above referred not to every individual, but to the family from which the king was to be taken. The crown did not necessarily descend to the eldest son; thus David appointed which of his sons should succeed him, and the people evidently expected him to do so. (1 *Kings*, i. 20.) But this right of selection was afterwards abrogated.

The *foreign relations* of the Israelites were of a simple character. Although, as stated above, it was a fundamental principle of the Mosaic law to avoid foreign intercourse, yet alliances with foreign nations were not forbidden. The alliances which were afterwards made, in the time of the kings, with Assyria and Egypt were sufficiently imprudent in their own nature to account for their being opposed by the prophets. There were however some nations whom the Israelites were commanded to exterminate—those Canaanites, namely, who dwelt in the land which they were to possess; this command was never perfectly obeyed, and in later times it was mitigated. Other nations, as the Amalekites, Ammonites, and Moabites, were represented by Moses as the hereditary enemies of the people of Israel, on account of injuries which they had done them, and which it was their duty to revenge when an opportunity occurred. The laws regulating war against other nations (*Deut.*, xx.) were exceedingly severe, but not more so than the international law then recognised is sufficient to account for, and the cruelties exercised by their heathen enemies are known to have been greater than any that the Israelites can be charged with. If a city resisted after being summoned to surrender, all the men in it were to be put to death, and the women and children made slaves. This law however only applied to the cities 'which were very far off;' but as to the cities of the Hittites, Amorites, and others, which were given as an inheritance to them by God, they were commanded to save alive nothing that breathed. The spoil was to be divided among the soldiers, except in some cases, when it was devoted to God and destroyed. Horses were to be hamstrung. The fruit-trees in the enemy's country were to be spared.

During the three great festivals, when every male went up to Jerusalem, there was a suspension of arms, the assurance being given by God that during these periods no man should desire their land. (*Exod.*, xxxiv. 24.) Michaelis endeavours to show that this truce was observed by all the surrounding nations except the Canaanites, who were therefore destroyed.

Embassies were only resorted to on particular occasions, and the persons of ambassadors were sacred. When the Israelites wanted to pass through the territories of other people, Moses asked permission of the inhabitants.

The foundation of the *civil law* of Moses is laid in the command, 'Thou shalt love thy neighbour as thyself.' (*Levit.*, xix. 18.)

1. *Laws relating to Property.*—Moses ordained that after the conquest of Canaan the land should be divided by lot in equal portions among the Israelites, and should then be inalienable for ever. This law was invested with a religious sanction, by representing God as the proprietor of the whole land, which the people only held as tenants under him. (*Levit.*, xxv. 23.) The land might be sold *nominally*, but as it reverted to the original owner or his heirs in the year of *jubilee*, which was every fiftieth year, such a sale amounted only to the sale of the crops for fifty or fewer years. Land so sold might be redeemed on certain conditions before the year of jubilee. (*Levit.*, xxv. 25, &c.) The law against the alienation of land admitted of exceptions, the chief of which was that land vowed to God, if not redeemed before the jubilee, became the property of the priests. (*Levit.*, xxvii. 16.) Moses however plainly intended that land sold or vowed should always be redeemed before the jubilee.

A provision was made for avoiding litigation respecting the crops upon the ground at the jubilee, by the institution of the *sabbatical year*, during which there was to be neither sowing nor reaping, but all the land was to lie fallow. Every seventh year, and likewise the year of jubilee, was a sabbatical year. A promise was annexed to the law, that the crop of the sixth year (or perhaps we should read of the *six years*) should be sufficient to afford food while the land lay fallow. (*Levit.*, xxv. 20-22.) Michaelis is of opinion that the tendency of this law was to increase the national wealth by affording a strong inducement to store up corn during the six years of plenty, part of which might be sold at an increased price to the neighbouring commercial nations in the seventh year; but this seems a very unsatisfactory explanation of the matter. He also mentions other incidental advantages, as he considers them, of this institution. (Mich., *Arts*. 74, 75.)

The laws of the jubilee and sabbatical years do not appear to have been long observed; indeed it is plain from *Levit.*, xxvi. 34, that Moses expected them to be disregarded. From 2 *Chron.*, xxxvi. 21, it appears that up to the Babylonish captivity there had been seventy sabbatical years neglected. This would carry us back nearly 500 years, namely, to the reign of Saul or David, as the time at which the observance ceased.

A man's property descended to his sons, of whom the eldest had a double share. (*Deut.*, xxi. 17.) The exclusion of daughters from the inheritance was established long before the time of Moses. (*Gen.*, xxxi. 14.) No provision is made in the law for the support of unmarried daughters. On the occurrence of a case in which a man died leaving only daughters, Moses made the law that in all such cases the daughters should inherit their father's property, but that they must not marry out of their own tribe. The husbands of such heiresses were reckoned as the sons of their father-in-law, and took his name. Failing daughters, the inheritance passed to a man's brethren; failing them, to his father's brethren; and failing them, *to the next of kin* of the deceased. (*Numb.*, xxvii. 1-11.) But the law gives no directions as to determining *who* are the next of kin: probably this was already determined by custom. The Mosaic law contains nothing on the subject of wills; but we find that the right of bequeathing property other than land existed both before and after his time, and he nowhere prohibits it.

2. *Laws relating to Persons.*—The laws of Moses inculcate the most complete filial obedience. (*Exod.* xx. 12; compare *Ephes.* vi. 1-3.) The power of fathers over their sons was great, and does not appear to have ceased as they grew up. We have here a remnant of the patriarchal state. Flagrant acts of disobedience were punished with death (*Exod.*, xxi. 17; *Levit.*, xx. 9), which however could only be inflicted by a judicial process, and not at the pleasure of the father (*Deut.*, xxi. 18-21). Fathers, and even mothers, chose wives for their sons. Next to the father, the first-born had the greatest power over the family, though it does not clearly appear in what this consisted, nor whether it was exercised in his father's lifetime. Though whatever opened the womb was *a* first-born (*Exod.*, xiii. 12), yet it is clear from *Deut.* xxi. 15, and 1 *Chron.*, v. 1, 2, that *the* first-born of a family was the first born to a man of all his children, and not the first born by each of his wives.

Marriage Laws.—Among the Hebrews, as among other Oriental nations, wives were generally bought (*Gen.*, xxix. 15-30; xxxiv. 12; *Hosea*, iii. 1-2), and in certain cases their price was fixed by law (*Exod.*, xxii. 16, 17; *Deut.*, xxii. 28, 29). Some wives were not bought, and these enjoyed greater freedom than the others. In certain cases concubines were allowed. (*Exod.*, xxi. 7-11; Michaelis, *Arts*. 87, 88.)

The marriage law of Moses had in general a tendency to promote marriage, and this chiefly by his sanctioning the notion, which he found already prevailing among the people, that it was highly honourable for a man to have posterity who might perpetuate his name, and by his engrafting upon this notion the law of *levirate marriages*, by which it was enacted that when a man died leaving a widow, his brother should marry her, and raise up children to his brother; that is, children who were to be accounted as belonging to the first husband, and who were enrolled in the genealogical registers in his name.

The Mosaic law prescribes no marriage ceremonies. We may conjecture from history (*Gen.*, xxix. 22-28) that ceremonies much resembling those of the Arabians in the present day (Lane's *Modern Egyptians*, vol. i., c. 6) were already in use, which Moses left as he found them. He connected no religious ceremony with the solemnization of matrimony. The bridegroom might put away his wife if the *signa virginitatis* were wanting (*Deut.*, xxii., 13-21). A

right understanding of this law is very important to the explanation of the doctrine of Christ concerning divorce (*Matt.*, v. 31-32), which has had no small influence on the marriage laws of Christian countries. (Michaelis, *Arts.* 92, 93.)

Moses permitted polygamy, as is proved by the laws in *Exod.*, xxi. 9, 10, *Levit.*, xviii. 18, *Deut.*, xxi. 15-17, by the constant practice of it both before and after his time, connected with the fact that he nowhere prohibits it, and by the small number of the first-born compared with the whole number of males, namely, about 1 in 42 (*Numb.*, iii. 43). But he permitted it only as a matter of policy, 'on account,' as Christ said, 'of the hardness of the people's hearts,' that is, the difficulty of rooting out inveterate customs, and perhaps for other reasons, which are pointed out by Michaelis (*Art.* 96). Some of his laws have a strong indirect tendency to prevent it, for example, the buying of a wife; and notwithstanding some striking examples of its practice, as that of Solomon, it does not appear to have prevailed extensively among the Israelites. (Mich., *Art.* 95.) After the Babylonish captivity it ceased entirely. Moses however set limits to the practice of polygamy, not allowing *many* wives. (*Deut.*, xvii. 17.) Moses prohibited marriages between certain near relations, some of which, those namely between parents and children, brothers and sisters, he considered as opposed to natural morality, for he calls them *abominations*, and represents them as sinful in themselves. Other marriages between relations were probably forbidden only for reasons connected with the character and habits of the people. (*Levit.*, xviii. 20; Michaelis, book iii., c. 7.)

Of *divorce* Moses was no favourer, at least if we may judge by the way in which he speaks of the marriage bond in *Gen.*, ii. 24; but he allowed it to a greater extent than he altogether approved, 'because of the hardness of their hearts' (*Matt.*, xix. 8). The law of divorce is in *Deut.*, xxiv. 1-4. If a man disliked his wife, he might put her away by giving her a writing of divorcement. She might then marry again; but if her second husband put her away or died, she might not return to her first husband. (Mich., *Arts.* 119, 120.) No provision is made for the support of the divorced wife. In certain cases the husband forfeited his right of divorce (*Deut.*, xxii. 19, 29). The support of a widow after her husband's death was provided for, if she had no children, by the law of levirate marriages; if she had children, it was left to filial piety.

Laws respecting Slaves and Servants.—Moses found slavery already existing among the Israelites and their neighbours. He permitted it to continue, under certain restrictions, and his laws on this subject are conceived in the most merciful spirit (see especially *Deut.*, xxiii. 15, 16). Slaves were acquired by capture in war, by purchase, and by the marriage of slaves. Of purchase there were four kinds: 1, when a slave was transferred from one master to another; 2, when a man under the pressure of poverty sold himself for a slave; 3, when parents sold their children; 4, when an insolvent debtor, or a thief unable to make restitution, was sold as a punishment. The value of slaves was of course variable, but in two cases it was fixed by law (*Exod.*, xxi. 32; *Levit.*, xxvii. 1-8). Besides the slaves of private individuals, there were others who belonged to the public; these were employed in menial labours for the service of the sanctuary. Slaves might have property of their own. A master might beat his slave, but not so as to kill him (*Exod.*, xxi. 20, 21); if he even maimed him, the slave was to be set free (*Exod.*, xxi. 26, 27). A Hebrew slave possessed this advantage over a foreign one: he was entitled to his freedom in the sabbatical year and in the year of jubilee, and he might be redeemed before the year of jubilee, while the stranger might be held in slavery for ever. The manumitted slave received presents from his master (*Exod.*, xxi. 2-11; *Levit.*, xxv. 39-55; *Deut.*, xv. 12-18). Slaves had to conform to some of the principal religious ceremonies observed by the Israelites.

Besides the slaves, there were day labourers, who were to share in the rest of the seventh day, and in the spontaneous produce of the sabbatical year, and whose hire was to be paid every day before sunset (*Levit.*, xix. 13; xxv. 6; *Deut.*, xxiv. 14, 15). The statute in *Deut.*, xxv. 4, besides its literal meaning, probably meant also that servants were to share in the food they prepared for their masters.

The Goël, or Blood-Avenger.—There was a custom of antient standing among the Israelites, and which exists to this day among the Arabs, which made it the duty of the nearest relation of a murdered person to pursue the murderer and kill him with his own hands. This relation is called in Hebrew *Goël*, in Arabic *Taïr*. This usage, which was probably of high antiquity, is dangerous to any state, from the haste and passion in which vengeance is exercised, and from the hereditary feuds which it causes between families. Moses dealt with this as he dealt with other long established customs of which he disapproved, not making the vain attempt to root it out, but surrounding it with provisions calculated to mitigate its evils. Six cities of the Levites were appointed as cities of refuge for the manslayer, and every facility of access to them was provided. If he escaped to one of these, he was safe from the avenger of blood (*Exod.*, xxi. 12, 13; *Numb.*, xxxv.; *Deut.*, xix. 3) But these cities afforded no asylum to the wilful murderer, who, when proved to be guilty, might be torn even from the altar (*Exod.*, xxi. 14; *Deut.*, xix. 11-13). At the death of the high-priest, the person who had taken sanctuary might leave the city of refuge in safety. These laws seem to have acted as an effectual check on the practice of blood-avenging, for an instance of it rarely occurs in the later history of the Israelites.

The Mosaic law commanded kindness to be shown to strangers, who, unless they belonged to certain nations that had been guilty of flagrant outrages against the Israelites, might 'enter the congregation of Jehovah,' that is, might be naturalised in Israel. Moses inculcates veneration for old age, and kindness to the deaf and blind (*Levit.*, xix. 14, 32; *Deut.*, xxvii. 18). He made laws in favour of the poor (*Deut.*, xv. 11), besides adopting usages already in existence for their benefit; though many of his laws discourage begging. He recommended the people to lend to them (*Deut.*, xv. 7-11), he gave them the right of gleaning, and of collecting the spontaneous produce of the earth during the sabbatical year (*Levit.*, xix. 9, 10; xxv. 5, 6; *Deut.*, xxiv. 19-21; *Ruth*, ii. 2-19), and the remains of the second tithes and firstlings, which were sacrificed as thank-offerings, were given as entertainments to the poor (*Deut.*, xii. 5-12, 17-19; xiv. 22-29; xvi. 10, 11; xxvi. 12, 13).

Personal Rights and Obligations.—*Vows to God* were declared binding, though the making of them was neither encouraged nor discouraged. They were remissible in certain cases (*Levit.*, xxvii.; *Numb.*, xxx.; *Deut.*, xxiii. 21-23).

On many points relating to *debt*, the Mosaic law is silent. An insolvent debtor was liable to have his hereditary lands seized, also his houses and other property, his clothes (but with a humane restriction, *Exod.*, xxii. 26, 27), and his person; he might be sold into slavery with his wife and children (*Levit.*, xxv. 39). Of imprisonment for debt the Mosaic law knows nothing, and still less of torture, though both have been attributed to it from a misunderstanding of some passages in the New Testament (*Matt.*, v. 26; xviii. 30, 34).

Pledges were allowed to be taken, under certain regulations which were meant to secure the debtor from the rapacity of his creditor (*Deut.*, xxiv. 6, 10-13; *Exod.*, xxii. 26, 27). Of *suretyship* the Mosaic law says nothing, but it is frequently referred to in the 'Proverbs of Solomon.' *Interest* on loans, whether of money or produce, was forbidden to be taken from Israelites, but it might be received from strangers (*Exod.*, xxii. 25; *Levit.*, xxv. 35, 37; *Deut.*, xxiii. 19, 20). The reasons for this prohibition appear to be founded entirely on the peculiar polity of the Israelites. (Michaelis, *Art.* 155.) Loans are regarded by Moses as alms. In the seventh year a poor debtor could not be sued, as there were no crops on the ground (*Deut.*, xv. 1-11). It does not appear to be the meaning of this law, that debts were *cancelled* in the seventh year, though perhaps such a release took place in the year of jubilee. Injuries done to property were to be compensated, and things found were to be restored to the owners; there are several laws on the details of these cases. (*Michaelis*, book iii., c. 12, pt. 3.)

The Mosaic law contains several enactments on behalf of beasts, many of which have a tendency to preserve the breed of such as are useful to man.

Police Law.—1. *Civil Police.*—The population was to be ascertained by a periodical census, the time of which is not specified in the statute. Every individual numbered paid a capitation tax of half a shekel. (*Exod.*, xxx. 11-16.)

2. *Military Police.*—Every man above 20 years old was liable to be called out to war. (*Numb.*, i. 3-46; xxvi. 2.) But generally a selection was made by the Scribes, who

also appointed the officers. Under the kings permanent officers were appointed. Exemption from military service was allowed to the man who had built a house and not yet occupied it, to him who had planted a vineyard or oliveyard and not yet enjoyed its fruit, to him who had betrothed a wife, and to him who had married within a year. (*Deut.*, xx. 5-7.) Cowardice was also a ground of exemption, but attended with disgrace. The spoil taken in war was divided into two parts; that in persons and cattle was collected and distributed among the people, those who went to war and those who remained at home having equal portions, and that in effects was the property of the soldier who seized it. Many regulations are made to promote cleanliness and discipline in the camp, which with this object was declared to be sacred.

3. *Ecclesiastical Police*, or the *Ceremonial Law*.—In this part of the Mosaic law many ceremonies are ordained which appear frivolous and unmeaning, unless we keep in view the fact asserted both in the Psalms and in the New Testament, and fully explained in the Epistle to the Hebrews, that most of the Levitical rites were only types of the blessings to be enjoyed under the Christian dispensation. We do not enlarge on this subject, as we are not here regarding the Mosaic laws in their theological aspect.

Circumcision, which had long before been given by God to Abraham, was adopted in the Mosaic law as the ceremony by which every male was admitted to the civil and religious privileges of the people of Israel. (*Gen.*, xvii. 9-14; *Levit.*, xii. 13.) Every bond-servant among the Israelites was obliged to submit to this rite, and also every stranger who wished to be naturalised among the people and to partake of the passover.

Offerings were of three kinds: 1. Bloody, consisting of slaughtered animals, which must be those regarded by the law as *clean*. They were either *burnt-offerings*, which were wholly consumed on the altar; *sin-offerings*, made on account of any sins committed through ignorance, of which only a part was laid on the altar; or *feast-offerings* or *peace-offerings*, of which only the fat parts were burnt and the rest eaten. 2. Unbloody, or *meat-offerings*, consisting of meal, bread, &c. 3. *Drink-offerings*, consisting of wine, of which part was poured on the victim and part given to the priests. Sacrifices might only be offered at the place which God might appoint, which in the Wilderness was the tabernacle; this law was doubtless intended to prevent idolatry. Besides their typical significance, these sacrifices had important moral and physical advantages, which are pointed out by Michaelis (*Arts.* 189-191).

Two *tithes* of all the produce of the land were due to God. The first was paid to the Levites for their support, and the second went to provide the feast-offerings. In addition to the tithes, the *first-born* of all animals, including man, were sacred to God, and belonged to the priests. This law had its origin in the sparing of the first-born of the Israelites when those of the Egyptians were slain. The first-born of beasts that might be offered in sacrifice were not to be redeemed, but those of other beasts and of man might be redeemed at a fixed price. (*Exod.*, xiii. 1, 2, 11-16; *Levit.*, xxvii. 26; *Numb.*, xviii. 15-19.) The first-fruits of crops and other produce belonged also to the priests (*Levit.*, xxiii. 9-14; *Numb.*, xv. 19-21; xviii. 11-13; *Deut.*, xviii. 4-5). There was another sort of firstlings which were employed for feast-offerings (*Deut.*, xii. 6; xiv. 23; xv. 19-23).

The Sabbath.—Every seventh day was a day of rest and of religious worship. This was no new law of Moses; it had been enjoined upon man, at the creation of the world, to celebrate the resting of God on the seventh day. (*Gen.*, ii. 3.) In the Mosaic law it was also a commemoration of the deliverance of the Israelites from Egypt, and some of the peculiarities in the Jewish observance of the day are undoubtedly connected with that fact. No servile work whatever was to be done on the Sabbath, except what was necessary for the service of the sanctuary. The punishment for transgressing this law was death. (*Exod.*, xvi. 22-30; xx. 8-11; xxiii. 12; xxxi. 12-17; xxxiv. 21; xxxv. 1-3; *Numb.*, xv. 32-36; *Deut.*, v. 12-15.) [SABBATH.]

There were three *annual festivals*, each lasting seven days, during which all the males in Israel were obliged to assemble at the place where the sanctuary stood. (*Exod.*, xxiii. 14-17.) These were—1. The passover, to commemorate the *passing over* of the Israelites by the destroying angel when he slew the first-born of the Egyptians. It fell on the evening after the 14th day of the first month of the year, that is, very near the vernal equinox, and at the beginning of harvest. 2. The feast of pentecost was held at the end of harvest, on the 50th day after the 16th of the first month. It was a feast of thanksgiving for the harvest. 3. The feast of tabernacles began on the evening of the 14th day of the seventh month, about October. It was a feast of thanksgiving for the fruitage and vintage. Remarks on the uses of these festivals and an account of the other feast days will be found in Michaelis (*Arts.* 197-201). He reckons that in the whole year there were 30 feast days, besides the 52 Sabbaths.

Many circumstances of the *private life* of the Israelites are regulated by the Mosaic law with great precision. The laws on this subject may be divided into two classes. 1. Regulations respecting meats, and their distinction into clean and unclean, with the prohibition against eating blood. 2. Laws relating to defilements, including those concerning leprosy. Both these classes of laws conduced greatly to the preservation of health and morality, and formed a strong barrier against idolatry. (Michaelis, *Arts.* 202-217.) For an account of several miscellaneous precepts of the Mosaic police law the reader is referred to Michaelis, book iv., c. 5.

Respecting the *criminal law* of Moses we have not space to enter into details. It is ably treated by Michaelis (book v.). This part of the Mosaic institutions is distinguished by equal justice, and by a careful gradation of punishment according to the enormity of crimes. Some offences, especially those of a religious character, were punished with a severity which to us may appear excessive; but this is only the carrying out of the principle by which the people were regarded as set apart to preserve the worship of the true God, and according to which it was a matter of the first importance to remove every defilement from among them. The Mosaic penal law introduced a vast improvement, by abolishing the practice of punishing children for the crimes of their fathers, and fathers for those of their children. (*Deut.* xxiv. 16.) The punishments are not cruel. They were—1. Death by the sword, or by stoning, followed in some cases by inflictions on the corpse of the criminal. There were no capital punishments which inflicted torture. 2. Exile, or excision from 'the congregation of God.' 3. Corporal punishments. 4. Fines. 5. Offerings to make atonement for sin: these kept up the idea that all offences were committed against God. None of the punishments for the living were degrading; for stripes are not considered so by Oriental nations, nor were they by the Hebrews.

Of the form of judicial procedure little is known, except that it was extremely simple. The purity of the judgment-seat is guarded by several statutes against bribery and partiality. Causes were heard in the gate of the city, according to immemorial usage in the East; and thus publicity was secured, as the city-gate was the common place of resort. Moses makes no mention of advocates. Witnesses, of whom *two or three* were necessary in capital cases, were examined upon oath. (*Levit.* v. 1; *Numb.* xxxv. 30; *Deut.* xvii. 6, 7.) In some cases oaths of purgation were required from the accused. (*Levit.* vi. 2, 3.) Sometimes a reference was made to God by lot in civil cases; and in criminal cases the lot was occasionally resorted to, but only for the discovery and not the conviction of the criminal. A criminal's confession might convict him capitally. (*Josh.* vii. 14-21; 1 *Sam.* xiv. 37-45; 2 *Sam.* i. 13-16.) Moses nowhere appeals to rewards and punishments in another life as a sanction for his laws.

The greatest care was taken to preserve the law. One copy of it was written in a book which was deposited in the sanctuary beside the ark of the covenant (*Deut.* xxxi. 26), and another copy was engraven on stones, which were fixed on Mount Gerizim or Mount Ebal (probably the former) with solemn ceremonies, in which the people swore to keep the law, blessings were invoked on the obedient, and curses denounced on the transgressors. (*Deut.* xxvii., xxviii.)

Viewed as a whole, the laws of Moses seem perfectly adapted to the character of the people for whom he legislated, and to the physical and political condition of the country they were to inhabit. No mistake can be greater than that which is made by many people when they suppose that because these laws came from God, therefore they are the best code that can ever be formed. Had they possessed

this ideal excellence, they would have been really bad laws, because they would have been unsuited to the nation they were intended to govern. They were not meant to be unalterable; indeed some of them were altered by Moses himself. They were only intended to last for a time, and therefore, when considered with reference to our present experience of human affairs, they appear to have many imperfections.

The *origin* of the Mosaic legislation is declared in Scripture to be from God, by which we must understand that these laws were sanctioned by God and published by his command. It has already been observed that many of the laws did not originate with Moses, but were antient observances which he adopted in his code by the command of God. (See also Iken, *Diss. II. de Institutis et Ceremoniis Legis Mosaicæ ante Mosem;* Reimar, *Cogitationes de Legibus Mosaicis ante Mosem.*) And moreover, when we remember that he was brought up in Egypt, and was 'learned in all the wisdom of the Egyptians' (*Acts*, vii. 22), when we compare various parts of his laws with similar institutions which existed in Egypt (for example, the freehold basis of the constitution, the separation of the caste of priests from the rest of the community, the discouragement of commerce, and the measures resorted to for keeping the Israelites distinct from other nations), it becomes highly probable, if not certain, that the Mosaic institutions were largely modelled on those of Egypt. This opinion, which is held by nearly all the best critics who have examined the laws of Moses, has been unaccountably regarded as opposed to the divine character of these laws, as if divine inspiration must necessarily deprive a legislator of the wisdom which he already possesses, and prevent him from adopting, under the sanction of that inspiration, whatever good he may find in the institutions of other nations. On the other hand there are many points of opposition between the Mosaic and Egyptian laws which it is impossible to overlook. Several of these are adduced by Michaelis, in a paper in the 'Comment. Soc. Götting.,' vol. iv., 'De legibus quibusdam a Mose eo fine latis, ut Israelitis Ægypti cupidis Palæstinam caram faceret.' The *spirit* of the whole law was, as Moses himself asserts (*Levit.* xviii. 3), diametrically opposed to that of the Egyptian as well as the Canaanitish institutions. For these reasons it is impossible to regard the Hebrew legislation as a mere copy of the Egyptian.

Some divines of the Rationalist party have maintained that Moses was not the author of the whole of the legislation of the Pentateuch. This opinion is opposed to the evidence which exists in favour of the genuineness and authenticity of the books of Moses. [PENTATEUCH.]

The following very useful table of reference is taken from Wilson's *Archæological Dictionary*, where it is said to be 'taken from a MS. in the library of St. John Baptist's College; given by Archbishop Laud, and probably either compiled by his Grace, or by his direction.'

THE FIRST CLASS.

The Moral Law written on the Two Tables, containing the Ten Commandments.

	Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap.
The first Table, which includes				
The First Commandment,	20. 13	..	..	5. 6
The Second Commandment,	20. 23. 34	19. 26. 18	..	4. 5 6. 7 8. 10. 11 12. 13
The Third Commandment,	20 23	..	..	5
The Fourth Commandment,	20. 23 31 34 35.	19. 23. 26	..	..
The second Table, including				
The Fifth Commandment,	20. 22	19	..	5
The Sixth Commandment,	20	19	..	5
The Seventh Commandment,	20	18. 19	..	5. 23
The Eighth Commandment,	20 22	19	..	5
The Ninth Commandment,	20. 23	19	..	5
The Tenth Commandment,	20	..	..	5
The Sum of both Tables,	..	19	..	6

THE SECOND CLASS.

The Ceremonial Law may be fitly reduced to the following heads, viz.:—

	Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap.
Of the Holy Place,	20	17	..	12
Of the Matter and Structure of the Tabernacle,	25 26. 27. 35	..	..	..
Of the Instruments of the same, viz.,				
The Laver of Brass,	30	..	..	..
The Altar of Burnt Offering,	27	..	..	..
The Altar of Incense,	30	..	..	..
The Candlestick of pure Gold,	25	..	..	..
The Table of Show-Bread,	25 26	..	..	..
Of the Priests and their Vestments for Glory and Beauty,	28	..	..	..
Of the choosing of the Levites,	..	..	1. 3. 8	..
Of the Priest's Office in general,	..	..	3. 18	..
Of their Office in Teaching,	..	19. 10	..	18. 12. 17. 33
Of their Office in Blessing,	..	..	6	..
Of their Office in Offering, which Function, largely spreading itself, is divided into these Heads, viz.,				
What the Sacrifice ought to be,	..	22	..	15. 17
Of the continual Fire,	..	6	..	..
Of the Manner of the Burnt Offerings,	..	6. 7	..	..
Of the Manner of the Peace Offerings,	..	3. 7	..	..
Of the Manner of the Sacrifices according to their several kinds, viz.,				
For Sin committed through ignorance of the Law,	..	4	5	..
For Sin committed through ignorance of the fact,	..	5. 7	..	..
For Sin committed wittingly, yet not through Impiety,	..	6	5	..
The Special Law of Sacrifices for Sin,	..	6. 7	..	..
Of things belonging to the Sacrifices,	..	2 6. 7	15	..
Of the Shew-Bread,	..	24	..	..
Of the Lamps,	27	24	8	..
Of the Sweet Incense,	30	..	..	..
Of the use of ordinary oblations, whereof there were several kinds observed by the Priests,				
Of the Consecration of the High Priest and other Priests,	29. 30	6. 8	..	..
Of the Consecrations and Office of the Levites,	..	..	8	..
Of the Dwellings of the Levites,	..	..	35	..
Of the Anointing the Altar and all the Instruments of the Tabernacle,	29. 30	..	..	..
Of the continual Daily Sacrifices,	29	..	28	..
Of the continual Sabbath Day's Sacrifice,	..	..	28	..
Of the Solemn Sacrifice for Feast Days, which were diverse and had peculiar rites distinguished into these, viz.,				
Of Trumpets,	..	..	10	..
Of Kalends or beginning of Months,	..	..	28	..
Of the three most Solemn Feasts in general,	23 34	23	..	16
Of the Feast of Passover,	12. 13 25. 34	23	9 28	16
Of the Feast of Pentecost,	23. 24	23	28	16
Of the Feast of Tabernacles,	23. 24	23	29	16
Of the Feast of Blowing the Trumpets,	..	23	29	..
Of the Feast of Expiation,	30	16 13	29	..
Of the First Fruits,	22. 23. 34	2	15	26
Of Tythes,	..	21	18	12 14. 26
Of Fruits growing and not eaten of,	..	19	..	..
Of the First-Born,	13. 22. 34	..	..	15
Of the Sabbatical Year,	23	25	..	..
Of the Year of Jubilee,	..	25	..	..
Of Vows in general,	..	27	30	13
What Persons ought not to make Vows,	..	..	30	..
What things cannot be Vowed,	..	27	..	23
Of Redemption of Vows,	..	27	..	..
Of the Vows of the Nazarites,	..	..	6	..
Of the Laws proper for the Priests, viz.,				
Of Pollutions,	..	22	..	..
Of the High-Priest's Mourning,	..	21	..	..
Of his Marriage,	..	21	..	..
Of the Mourning of the Ordinary Priests,	..	21	..	..
Of their Marriage,	..	21	..	..
Of their being forbid the use of Wine, &c.,	..	10	..	..
Of Sanctified Meats,	..	6. 17. 19. 22	5. 18	12. 15. 18
Of the Office of the Levites, viz.,				
Teaching,	..	..	..	17. 27. 31.
Offering,	..	..	3. 4. 18	10
Other Promiscuous Ceremonial Laws, viz.,				
Of Uncleanness in general,	..	15. 19	5	..
Of Uncleanness in Meats, viz.,				
Of Blood, Gen. ix.	23	7. 17. 19	..	12
Of Fat,	..	3. 7	..	..
Of Dead Carcasses,	22	17	..	14
Other Meats and divers Living Creatures,	..	11. 20	..	14
Of Uncleanness in the Issue of Seed and Blood,	..	15. 12	..	23
In the Dead Bodies of Men,	..	..	19	..
In the Leprosy,	..	13. 14	5	24
Of Circumcision, Gen. xvii.	..	12	..	..
Of the Water of Expiation,	..	..	19	..
Of the Mourning of the Israelites,	..	19	..	14
Of mixtures,	..	19	..	22
Of their Garments and Writing the Law privately,	..	..	15	6. 11. 22
Of Young Birds not to be taken with the Dam,	..	..	..	22
Of their Paddle Staves,	..	..	..	23

The Third Class.

The Political Law.

N.B. The magistrate is the Keeper of the Precepts of both Tables, and to have respect to human society; therefore the Political Laws of the *Israelites* are referred to both the Tables, and are to be reduced to the several Precepts of the Moral Law.

Laws referred to the First Table, namely,	Exod. chap.	Levitic. chap.	Numb. chap.	Deut. chap
1st. To the First and Second Commandments, viz.,				
Of Idolators and Apostates,	22	20	..	13 17
Of Abolishing Idolatry,	23. 24	..	..	7. 12
Of Diviners and False Prophets	22	19. 20	..	18
Of Covenants with other Gods,	23. 24	..	..	7
2nd To the Third Commandment, viz.,				
Of Blasphemies,	..	24	15	..
3rd. To the Fourth Commandment, viz,				
Of breaking the Sabbath,	31.35	..	15	..
Political Laws referred to the Second Table,				
1st. To the Fifth Commandment, viz,				
Of Magistrates and their authority,	22. 30	..	11	1. 16. 17. 23
Of the Power of Fathers,	21	20	..	21
2nd To the Sixth Commandment, viz.,				
Of Capital Punishments,	..	..	..	21. 24
Of Wilful Murder,	21	24	35	19
Of Manslaughter unwittingly Committed, and of the Cities of Refuge,	21	..	35	19. 21. 22.
Of Heinous Injury,	21	24	..	25
Of Punishments not Capital,	..	..	..	25
Of the Law of War,	..	..	..	20. 23
3rd. To the Seventh Commandment, viz,				
Of Unlawful Marriages,	..	18. 20	..	7. 22
Of Fornication,	..	19	..	23
Of Whoredom,	22	21	5	22
Of Adultery and Jealousy,	..	19. 20	..	..
Of Copulation against Nature,	22	18. 20	..	..
Of Divorcements,	..	..	..	24
Other Matrimonial Laws,	21	18. 20	..	21. 22. 24. 25.
4th. To the Eight Commandment, viz,				
Of the Punishment of Thefts,	22	..	5	..
Of Sacrilege, Joshua, vii.	..	..	..	..
Of not Injuring Strangers,	22. 23	19	..	10
Of not Defrauding Hirelings.	..	19	..	26. 25
Of Just Weights,	..	19	..	25
Of Removing the Landmark,	..	..	..	19
Of Lost Goods,	22	..	..	..
Of Stray Cattle,	22. 23	..	..	22
Of Corrupted Judgments,	23	19	..	16. 24
Of Fire breaking out by chance,	22	..	..	..
Of Man stealing,	..	..	.	24
Of the Fugitive Servant,	..	..	..	23
Of Gathering Fruits,	..	19. 23	..	23. 24
Of Contracts, viz.,				
Borrowing,	..	..	..	15
Of the Pledge,	22	..	..	24
Of Usury,	22	25	..	23
Of Selling,	21	25	..	15
Of the thing Lent.	22	..	..	..
Of a thing Committed to be kept,	22	..	..	..
Of Heirs,	..	..	26. 27. 33. 36	21
5th. To the Ninth Commandment, viz.,				
Of Witnesses.	..	5	..	17. 19
The Establishing the Political Law,	..	..	..	4
The Establishing the Divine Law in general,	..	..	..	6. 11. 29 30. 31
From the Dignity of the Law-giver,	..	19. 20. 22	15	5. 6. 7. 8 10. 26. 27
From the Excellency of the Laws,	..	..	..	4. 26
From the Promises,	15. 19. 23. 24	18. 26	..	4 5 6. 7. 10. 11. 12. 20
From the Threatenings,	23	26	..	4 7 11. 27 28. 29 30

(Michaelis, as quoted above; Salvador, *Histoire des Institutions de Moïse et du Peuple Hébreu;* Pastoret, *Histoire de la Législation*, tom. iii.; Jahn's *Biblische Archäologie*, th. ii.; Lowman's *Dissertation on the Civil Government of the Hebrews;* Sponcer, *De Legibus Hebræorum;* Witsii *Ægyptiaca;* Warburton's *Divine Legation of Moses;* Hales's *Analysis of Chronology*, vol. ii.; Winer's *Biblisches Realwörterbuch*, arts. 'Moses,' 'Gesetz,' &c.; the Commentaries on the Pentateuch of Vater, Rosenmüller, &c.; Graves *on the Pentateuch;* Faber's *Horæ Mosaicæ;* Lane's *Modern Egyptians*, and other works on the Arabians, furnish excellent illustrations of some of the Mosaic Institutions.)

MOSHEIM, JOHANN LORENZ VON, was born of a noble family at Lübeck, October 9, 1694. He was educated at the gymnasium of Lübeck and the university of Kiel. At Kiel he succeeded Albert zum Felde as professor of philosophy in the university. At the invitation of the duke of Brunswick he became professor of theology in the university of Helmstedt, where he remained from 1725 to 1747, when he was appointed professor of theology at Göttingen and chancellor of the university. Here his lectures on theology attracted all classes of students. He died on the 9th September, 1755, at the age of 61. He was thrice married. By his first wife he had two sons and one daughter, and by his third wife one daughter, afterwards duchess of Noailles.

Mosheim was greatly distinguished as a preacher. His style was formed on the model of the great English and French preachers, Tillotson and Watts, Saurin, Massillon, and Fléchier. He has been compared to Fénélon for the graces of his style, and he is considered one of the founders of the modern German literature. His talents were of a very high order, his learning was immense, and his character was exemplary.

The whole number of Mosheim's works is 161. He himself published at Helmstedt, in 1731, a catalogue raisonnée of the works which he had published up to that time. His best known work is the 'Institutionum Historiæ Ecclesiasticæ, Antiquioris et Recentioris, libri iv.' This work, which is written in Latin, was first published in 2 vols. 12mo., in 1726, and the enlarged edition, in composing which he examined the original authorities, was published in 4to. in 1755, just before Mosheim's death. Another edition was published in 1764, with an account of Mosheim's writings by Miller, one of his pupils. It was translated into German by Von Einem, and by J. R. Schlegel. Schlegel's translation is the better, and is enriched with valuable notes. It has also been translated into French, Dutch, and English. The first English version was made in 1764, by Dr. Maclaine, an assistant minister at the Hague, and has been frequently reprinted. It is very unfaithful. Dr. Maclaine's professed object was to improve Mosheim's style, by adding words and rounding off periods. His alterations and additions constantly express his own sentiments instead of Mosheim's, and sometimes flatly contradict his author. In 1832 a faithful translation, with valuable notes, was published by Dr. Murdock, of New Haven, Connecticut, United States. Mosheim's Ecclesiastical History extends from the birth of Christ to the beginning of the eighteenth century. Each century is treated of separately, under the two heads of External and Internal History. The External History comprises *prosperous events*, or the extension of the Church by the efforts of its public rulers and private members, and *calamitous events*, such as persecutions and infidel attacks. The Internal History includes the history—1, of the Christian doctors; 2, of the doctrines and laws of the Church; 3, of its ceremonies and worship; 4, of heresies. This arrangement is open to several objections, of which the chief are, that it is too artificial; that what Mosheim calls external and internal history constantly run into each other (and indeed it is not easy to understand how any part of the history of a community can be said to be *external* to it); and lastly, it imposes on the historian the necessity of deciding what no human mind can decide, namely, what events are prosperous and what calamitous to the Church. But the work of Mosheim is open to a graver objection. He has not treated his subject with the proper spirit of pious interest, though his own orthodoxy is undoubted. Nevertheless, his deep knowledge, his patient research, his general candour and impartiality, and his philosophical spirit, entitle Mosheim to a place among the best church historians. His works gave an impulse to the study of Church history in Germany, which has produced, among other works, those of Pfaff, Baumgarton, Walsh, Semler, Schröckh, Henke, Schmidt, and Neander. Of these, that of Schröckh, a pupil of Mosheim, is the fullest, extending to 45 vols. 8vo. Neander's 'Kirchengeschichte' is still in progress: when completed, it will probably be the best that has yet appeared. Our own literature is very deficient in this branch; but recent events have revived the study of ecclesiastical history in England, especially at Oxford.

Mosheim published several works on Church history, besides the 'Institutions,' of which the most important are, his tract 'De Rebus Christianorum ante Constantinum,' and 'Institutiones Historiæ Christianæ Majores,' 1739, which is a full Church history of the first century. Among his other works are, a Latin translation, with notes, of Cud

worth's 'Systema Intellectuale,' Jena, 1738; six volumes of Sermons, 1747; and nine volumes on the 'Morals of Holy Scripture,' 1773.

MOSQUE (from the Arabic *Maschiad* or *Medsched*, and intermediately the Spanish and Portuguese *Mezquita* and *Masqueta*), a Mohammedan place of worship, the distinctive marks of which are generally cupolas and minarets. Internally they exhibit nothing remarkable as to plan or accommodation, forming merely a single large hall or apartment, without any seats or other fittings-up, and with no other decoration than that of pavements and carpets, or arabesques and mosaics on the walls. In regard to these latter, some of the mosques at Cairo are highly embellished. Although more famed than any other, the mosque of Santa Sophia at Constantinople exhibits nothing of Mohammedan or Arabian architecture, but was originally built as a church, and is in the Byzantine style.

MOSQUITO, a term applied to certain stinging flies belonging in all probability to several distinct genera. The mosquitoes are either gnats or gnat-like insects, which are furnished with a proboscis adapted for piercing the flesh, and at the same time forming a kind of siphon through which the blood flows; this instrument moreover injects into the wound which it makes a poison which causes inflammation.

Many insects called mosquitoes probably belong to the same tribe as the common gnat (*Culex*, Linn.); Humboldt however asserts that the insects known by that name in America belong to the genus *Simulium*, and that the *Culices*, which are equally numerous and annoying, are called *Zancudoes*, which means long legs. The former are what the French call *Moustiques*, and the latter *Cousins*.

The genus *Simulium*, according to Macquart (*Suites à Buffon; Hist. Nat. des Insectes*, 'Diptères'), belongs to the family *Tipulariæ* and section *Tipulariæ-florales*, and is thus characterised:—fourth joint of the palpi rather elongated and slender; antennæ cylindrical, 11-jointed; eyes round, ocelli wanting; basal joint of the tarsi as long as the others taken together; wings very broad, basal and marginal cells very narrow.

M. Macquart, in his account of the habits of the species of this genus, says, 'They frequent the leaves of shrubs under trees, and live upon the juices found upon those leaves, especially such as are produced by the plant-lice; they do not however confine themselves to this kind of nourishment, but when opportunity offers, like gnats, they suck the blood of animals and produce an equally painful wound. Their proboscis is much less complicated than that of the gnats, consisting, as in other *Tipulariæ*, merely of a labrum and lingua; these parts however are more developed than usual. These minute flies are constantly in motion, and in running apply the whole sole of the anterior tarsus to the plane upon which they may be moving; they moreover appear to use their fore-legs as feelers.'

MOSQUITO SHORE. [CENTRAL AMERICA.]

MOSS. [CHRISTIANIA.]

MOSSES. [MUSCI.]

MOSUL, or MOOSUL (Al-Moutsal, in Arabic), a large town of Turkish Asia, on the right or west bank of the Tigris, in a low and flat country on the road from Bagdad to Diarbekr and the high land of Armenia. It is likewise on the road from Bagdad to Aleppo (Haleb) and Asia Minor. Caravans trade between Mosul and Aleppo, carrying to the latter place gall-nuts from Kurdistan, and Indian goods from Bassorah, which they exchange in Syria for European manufactures. Indian goods are also forwarded to Tocat, in Asia Minor, from whence copper is received in return, and sent down by the Tigris to Bagdad. Notwithstanding the favourable position of Mosul, its trade, which was once considerable, is now reduced very low. The only manufacture now carried on to any extent within the town is that of coarse cotton cloths, dyed blue, and used by the lower order of people. According to Marco Polo, the muslins took their name from Mosul, where they were first manufactured. The Arabic spoken at Mosul differs considerably from that of Cairo, and even from that of Aleppo; it has a mixture of Turkish, Persian, and even Indian words in it. The population, which is said to be rather less than 50,000, is chiefly composed of Mohammedans, consisting of Arabs, Turks, and Kurds. The Christians are about 1800 families, namely, 1000 of Chaldeans, who have nine churches, four of the Latin or Western communion, and five Nestorian; 500 families of the Syrian Greek church, who have three churches; and 300 families of Jacobites or Eutychians, who have two churches. The Catholic or Latin bishop of Diarbekr, or of Chaldea, resides here. There are also about 300 Jewish families, who have a synagogue.

The government of Mosul is in the hands of a pasha of two tails, who has a very limited territory and is independent of the neighbouring pashas of Orfah and Bagdad, and receives his investiture from the sultan. He keeps a force of about 1000 men, chiefly cavalry.

The town is surrounded by a wall; the streets are narrow and unpaved. There are several bazars, numerous coffee-houses and baths, and about thirty mosques. A bridge of boats connects Mosul with the eastern bank of the Tigris, where some mounds are supposed to mark the site of antient Nineveh. [NINEVEH.] (Buckingham's *Travels in Mesopotamia*.)

MOTACILLA. [SYLVIADÆ.]

MOTALA-ELF. [SWEDEN.]

MOTET (*Mottetto*, Ital.), in Music, a vocal composition set to sacred words, and used in the Catholic church. The word was synonymous with anthem, when first introduced, and signified a superior kind of hymn, accompanied only by the organ. [ANTHEM.] Latterly however the Motet has lost much of its primitive solemnity, having been, for considerably more than half a century, written with full and florid orchestral accompaniments, and thus, like the Mass, is deprived of no small portion of its devotional character. Many attempts have been made to discover whence the word is derived, but without any satisfactory result.

MOTH, the English name of the insects belonging to that section of the Lepidoptera called *Nocturna*. [LEPIDOPTERA.]

MOTHE-LE-VAYER, FRANÇOIS DE LA, was born at Paris, 1588, and in 1625 succeeded his father as substitute to the procureur-général; but he soon abandoned his profession to pursue his favourite study of history. In 1639 he was admitted into the Academy. Cardinal Richelieu being pleased with his work on the education of a prince, intended to appoint him preceptor to the dauphin, but the queen, Anne of Austria, refused her consent. Notwithstanding this, in 1649 he was entrusted with the education of the young duke of Orleans, whose astonishing progress under the tuition of Le Vayer induced the queen to acknowledge the talents of the master and confide to him the completion of the king's (Louis XIV.) education.

He died in 1672, in the 85th year of his age.

Of his numerous works, which obtained extraordinary success, the most important are: 1, 'Discours de la Contrariété d'Humeurs qui se trouve entre certaines Nations, et singulièrement la Françoise et l'Espagnole,' Paris, 1636, 8vo. The title-page states it to be a translation from the Italian of Fabricio Campolini. 2, 'Considerations sur l'Eloquence Françoise,' 1638, 12mo. 3, 'De l'Instruction de Mons. le Dauphin,' 1640, 4to. 4, 'De la Vertu des Païens,' Paris, 1642, 4to.; 3rd edition, 1647. Several collections of his works have been made; but the best is that of Dresden, 1756-59, 14 vols. 8vo., the materials of which were furnished by Roland le Vayer, nephew of the author. La Mothe is styled the Historiographer of France by Voltaire (*Siècle de Louis XIV.*), who also mentions him as a notorious Pyrrhonist.

The great diversity of opinion which La Mothe observed in the world seems to have laid the foundation of that scepticism which pervades his writings. His society was eagerly sought by all the learned and enlightened persons of his time, and he was readily admitted into the brilliant circles of Mademoiselle Gournay, who at her death bequeathed him her library; but from the vulgar and prejudiced part of the community he experienced persecution. Passing one day under the galleries of the Louvre, some one, pointing to him, cried out, 'There goes a man with no religion!' 'My friend,' replied La Mothe, 'I have religion enough to forgive you the insult.'

He was nearly fifty years of age before he published his first work. From that time (1636) he published regularly every year. His work 'De la Vertu des Païens' was answered by Arnauld, in a tract entitled 'De la Nécessité de la Foi en Jesus Christ.' La Mothe's book not selling so fast as the bookseller desired, he made grievous complaints. 'I have a method that will facilitate its sale,' said the author, and immediately procured a prohibition against the reading of it, which had the desired effect, for the work was read with admiration, and every copy sold off. (*Biog. Univ.* Voltaire.)

MOTHER-OF-PEARL. [SHELL.]

MOTHER-WATER. When any saline solution has been evaporated so as to deposit crystals on cooling, the remaining solution is termed the mother-water, or sometimes merely the mothers.

MOTION is change of place; there has been motion when a body, at one time, occupies a part of space different from that in which it was at a preceding time. The only additional necessary conception is continuity of change: every point which has moved from one point of space to another must have passed over every part of some line, straight or not straight, drawn from one point to the other.

Some of the antients used the word in a more general sense, answering to change. Thus, according to them, creation, generation, corruption, increase, diminution, and change of place, are the six sorts of motion. We have here no further to do with this than to remind our readers, when they see *local* motion spoken of in old writings, that this is the term by which simple change of place, to which the word motion is now restricted, is distinguished from the other changes which the same word then denoted. We still apply the word, as we do terms of magnitude (see that word) to changes of the moral system, as in speaking of the motions and emotions of the mind.

If there be anything which would need neither definition nor comment, it might be supposed to be simple motion, a thing never absent from one moment of the waking perceptions, nor even of the dream. Its existence was however denied, or is reported to have been denied, by various of the Greek sophists, though it is highly probable that some matter-of-fact historians have handed down as a deliberate opinion what was merely meant for an ingenious attack on one or another established school. According to Sextus Empiricus (i. § 17), Diodorus surnamed Cronus, a Carian, disproved the existence of motion as follows:—If matter moves, it is either in the place in which it is, or the place in which it is not; but it cannot move in the place in which it is, and certainly not in the place in which it is not: consequently it cannot move at all. To which the first-named author replies, that by the same rule men never die, for if a man die, it must either be at a time when he is alive, or at a time when he is not alive. A better answer would have been, that it is true of all material phenomena that they happen either in the place in which the matter is, or in that in which it is not, except only the change from that place in which the matter is and will not be, to that in which it is not but will be. The syllogism of Diodorus may be useful to remind us that motion implies both spaces and times, since the sophism excludes the latter from consideration. Zeno of Elea (not the Stoic) gave the celebrated argument of Achilles and the Tortoise. [PROGRESSION.]

If we consider merely motion, without any reference to the matter moved or the quantity of external force required to move it, we have, as we conceive, a subject of pure mathematics before us, though this has been contested. Newton however used considerations of motion without hesitation in his fluxions; and his successors have endeavoured to avoid them by circumlocutions, which, however consonant they may be to conventional ideas of rigour, have never failed to introduce perplexity and obscurity to the beginner. It may be right to remind the student that the change of place introduced by Euclid (i., prop. 4 and other propositions) has not necessarily all the concomitants of the idea of motion; geometry would not interfere to prevent the superposition from being made without the notion of the triangle, whose place is changed, passing through the intervening parts of space. It was the introduction of the idea of *time* which the parties who objected to the doctrine of fluxions repugned.

But if we consider matter in motion, we must inquire into the external causes of motion, and the capabilities of matter with respect to motion; this we shall do in the next article [MOTION, LAWS OF], confining ourselves in the present one to the first-mentioned branch of the subject.

Next to the idea of motion comes that of swiftness, rate of motion, or velocity (see also the latter word), suggested by observing different motions, or different changes of place in the same time. But here we must observe, that we are rather indebted to motion for our measure of time than to time for our measure of motion. If sentient beings, like ourselves, had lived in perpetual day, without any recurrence of periodical phenomena in nature, or any mechanical means of generating equable motion, we have no right to suppose that they would ever have learned to consider time as a measurable magnitude. They might admit that it might be more or less, as we do of industry, courage, or any other moral qualities [MAGNITUDE], but we cannot be more destitute of measures for those qualities, than they would be of means for measuring time. Since however we have obtained, though by means of equable motion, a distinct idea of successions of duration, equal in magnitude, we use this idea in the definition of motion, just as in geometry we consider the line before the surface, though we have no certainty that we ever should have a distinct notion of a line, if we had not formed lines by the intersection of surfaces. We say, though we have no certainty, but we do not forget that many philosophers are of opinion that such ideas as those of time and of a line are fundamental notions, resulting from our rational organization, and (if we do not mistake them) anterior to observation, or, at least, not derived from it. This question is here immaterial, as we suppose all parties ready to start with a definite notion of time. Considering the motion of a simple point, which describes a line, it is called uniform when the lengths described in successive equal times are equal, *whatever each time may be*. It is important to remember this, since different successive motions may be uniform in some respects and not in all. Thus successive revolutions may be performed in equal times, as to whole revolutions, but equal fractions of one revolution may not be performed in equal times. In uniform motion, an arbitrary unit of time is chosen, and the length described in that time is called the *velocity*, which is simply the Latin for *quickness*. If extreme verbal correctness were required, this length should be called, not the velocity or swiftness, but the measure of the velocity. For the length described in (say) one second is not the velocity or swiftness, but something by which we judge of it. The word velocity is an abstraction from the comparison of motions; of two moving points, that one which described the greater length in a given time moved the quicker: and swiftness is the absolute substantive by which we express the existence of the obvious relation, just as magnitude is that by which we express the existence of the relation of greater and less.

When equal spaces are not described in equal times, we can imagine the rate of motion to change either gradually or discontinuously. Thus it can be imagined that a body which moves for some seconds uniformly at the rate of 10 feet in a second, may at once, without any intermediate state, take a velocity of 20 feet. But such a conception cannot be realised on any material body, though there may be all the appearance of it. [IMPULSE.] When the rate of motion is changing perfectly gradually, there seems to be no direct method of obtaining the rate at any one instant; for no successive equal spaces are described in equal times. This difficulty will be discussed in the article VELOCITY: for the present, it may be considered sufficient to take a length so small that the change of rate undergone in passing through it is insensible, and to consider the point as moving uniformly through that length. Let the very small length s be described in the small fraction t of a second; then $s:t$ is the length which would be described in one second at the same rate, since $t:1::s:(s:t)$, and $s:t$ may be taken for the velocity.

The existence of motion is detected either by a change of the distance of an object, or of its direction, or both; but it is not necessarily the object which moves. The spectator himself may be in motion unconsciously, and it is matter of common experiment that every motion of the spectator o which he is not conscious, and every rapid motion, whether he be conscious of it or not, causes surrounding objects to appear in motion. In walking, the effort necessary to maintain motion perpetually reminds us that it is ourselves who move; in a carriage, at an ordinary pace, we can always destroy the illusion of surrounding motions by a moment's thought. But if the attention drop, and we look at objects with the mind intent on other things, they soon take the motion of the carriage in a contrary direction. In the smooth motion of a boat, no effort of thought will enable the spectator to realise his own motion, and destroy that of the shore or a neighbouring vessel. We state that which we find to happen to ourselves; perhaps the experience of other persons may be different.

It may also happen that the object is in motion as well as the spectator, in which case the latter motion will be transferred to the former, in the manner in which we shall describe. The whole motion of the object, compounded of

that which it has of its own, and that which it appears to have from the motion of the spectator, is called the *apparent* or *relative* motion.

The method of ascertaining the relative motion is as follows:—Since we only determine the positions of bodies by their distances and directions; and since we suppose the motions both of the spectator and the object to be given, let a fixed point be taken to represent the position in which the spectator imagines himself to remain, and laying down the real distances and directions of the object at the end of successive times, set off those distances from the fixed point in the proper directions. The relative positions of the object being thus secured, the line passing through these positions will be that in which the object appears to move. For instance, let the spectator move through 123...89 while the object moves through ABC...HI, so that when the first is at 1, the second is at A; when the first is at 2, the second is at B, and so on; the last positions being 9 and I. Take O for a fixed point, at which the spectator fancies himself to be, and having joined 1 and A, 2 and B, &c., draw O*a* parallel and equal to 1A, O*b* parallel and equal to 2B, &c., and O*i* parallel and equal to 9I. Hence the spectator, fixed at O, will see the object successively at the same distances and in the same directions as *a*, *b*, &c., and *i*; whence the line *abc*...*hi* will be that of its apparent motion.

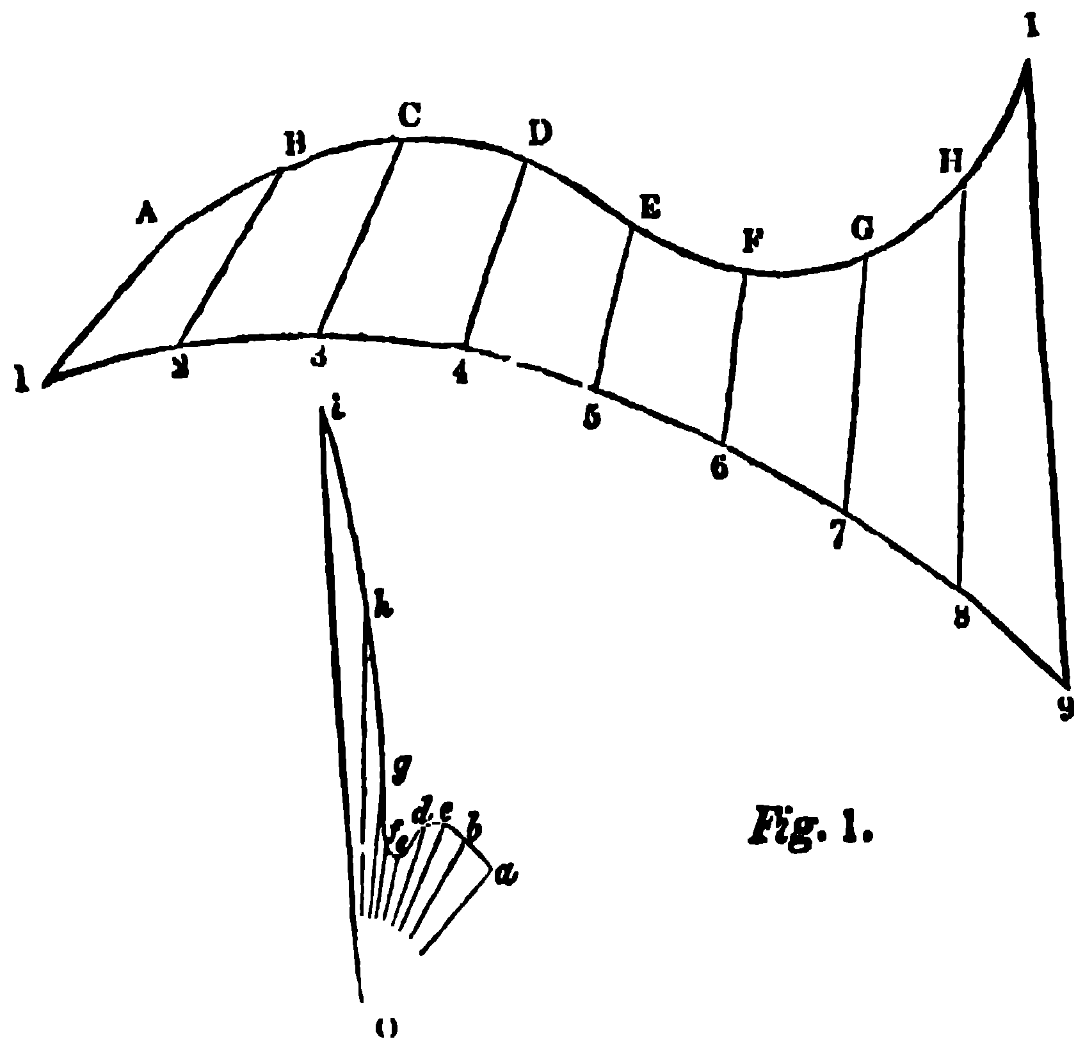
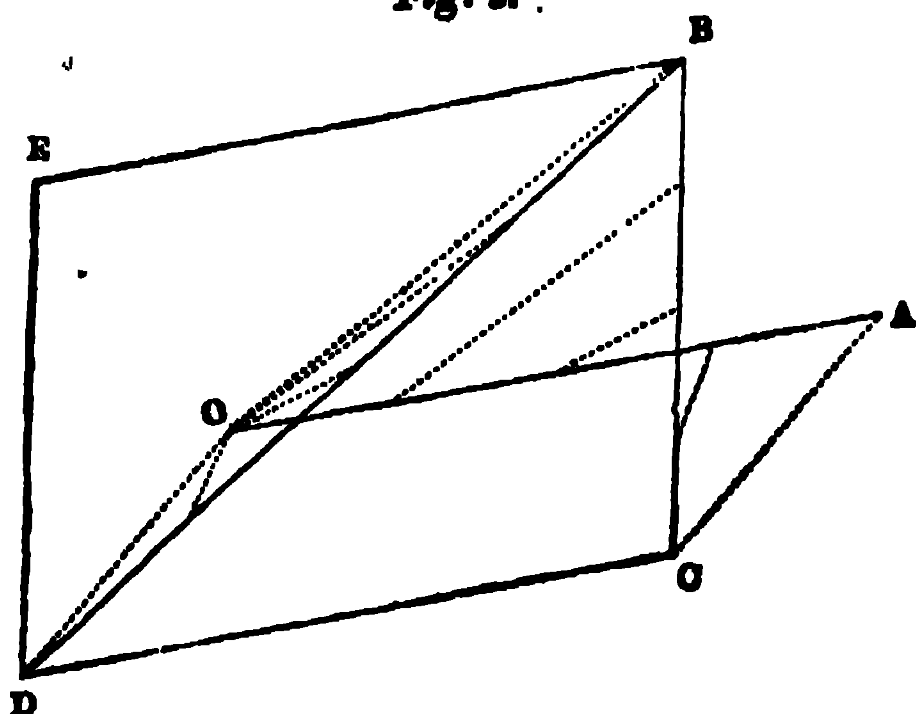


Fig. 1.

When both motions are rectilinear and uniform, the apparent motion may be more simply obtained, as follows:—Let the spectator move uniformly from O to A, while, in the same time, the object moves from B to C. Take the following method of fixing the spectator: as he moves forward from O to A let the paper on which the figure is drawn move backward in the direction contrary to OA, so that by the time the spectator has reached A, the point A shall have receded to where O was. He will therefore never have changed his place, his progression on the paper having been always compensated by the retrogression of the paper itself. Take CD parallel and equal to AO, whence the point C will, by the motion of the paper, at the end of the motion, be where D was at its beginning. Consequently the spectator, who imagines himself at rest, will give to B that motion which is compounded of a motion along BC, while

Fig. 2.



BC itself is carried into the position ED. That is, B will appear to move along the line BD, the spectator imagining himself to remain at O. The dotted lines show the method of proceeding, as first described.

While the ship A moves from A to B, let C move through CD, E through EF, G through GH, K through KL, M through MN, and let P remain at rest. Then, a spectator in A supposing himself at rest, C will appear to remain at C, E will appear to move through E*f*, G through G*h*, K

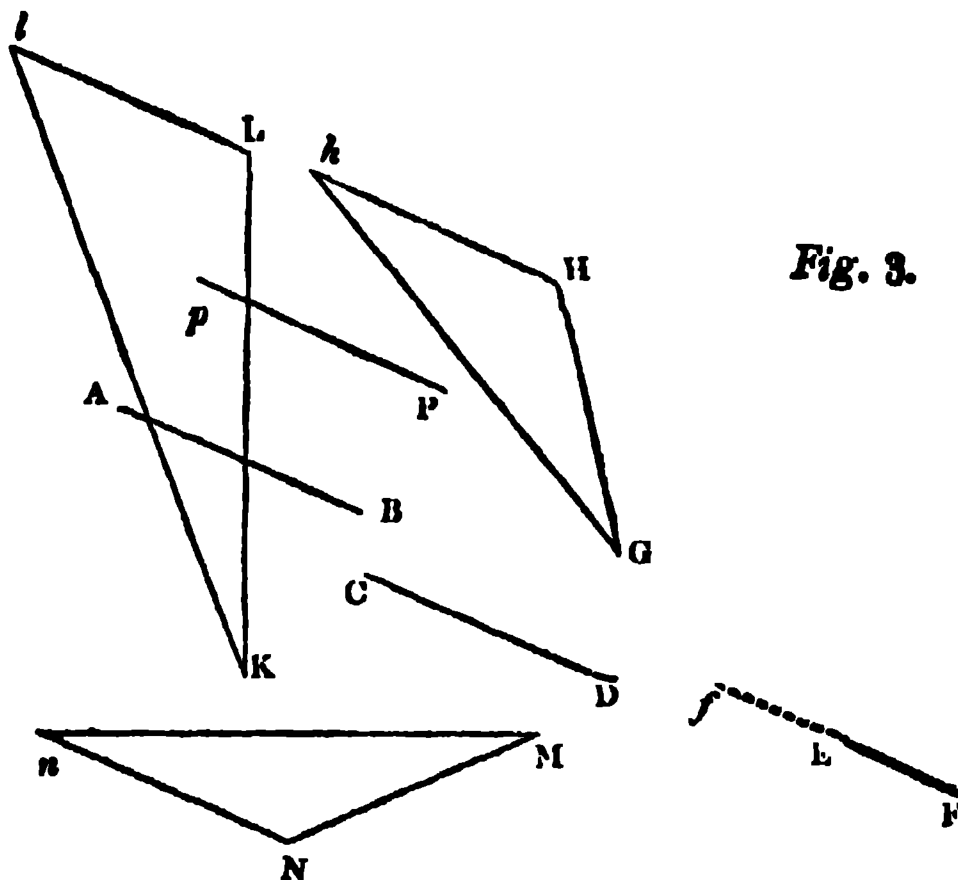


Fig. 3.

through K*l*, M through M*n*, and P through P*p*. The motion of A has been transferred in a contrary direction to each of the other vessels.

When bodies are very distant their changes of distance are not soon perceived, consequently it is only by change of direction that their motion becomes visible. This is the case in all the heavenly bodies; but we shall now show what the apparent motion of a planet, superior and inferior, would be, if changes of distance, as well as direction, could be perceived and estimated.

If the spectator be in motion, an object at rest appears to him to have precisely his own motion, but in a contrary direction: for if the object be O and the spectator move

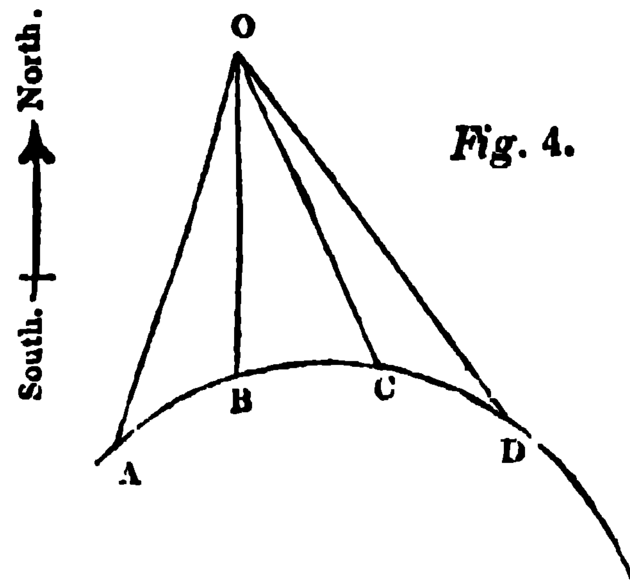
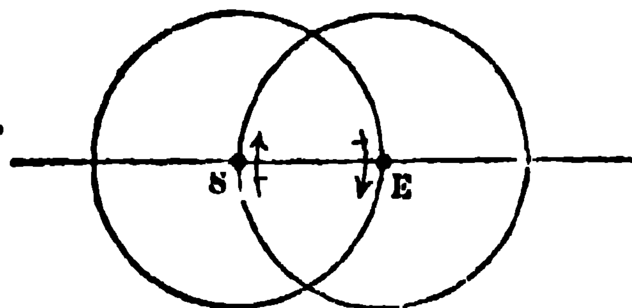


Fig. 4.

through ABCD, no distances would be changed if the spectator were fixed at O, and the object moved through ABCD, and all directions would only undergo a diametrical change. Consequently the relative motion of the object is represented by allowing it to change places with the spectator, and inverting the direction of north and south, which will have the effect of making the relative motion from west to east, if that of the spectator were from east to west, and *vice versâ*. Let us suppose now that the earth moves round the sun in a circle, which will be near enough for our present purpose; it will be immediately obvious that the direction of motion, so far as concerns the order in which the

Fig. 5.

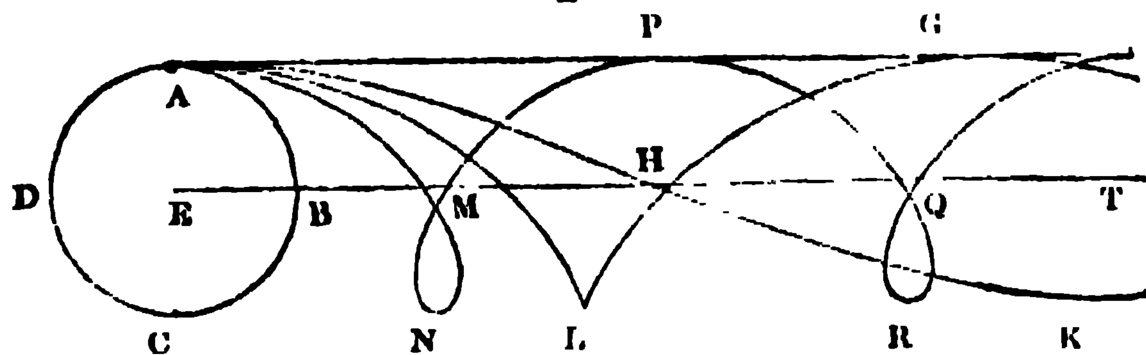


constellations will be described, is the same in the relative motion of the sun round the earth as in the absolute motion of the earth round the sun. For though the absolute directions of motion are opposite, yet S, to a spectator at E, is seen towards a point of the heavens opposite to that in which E appears from S. [MOTION, DIRECTION OF]

In giving to the sun the apparent motion which answers to the real motion of the earth, the same motion must be given to the orbits in which the planets are carried round the sun. The question then is as follows: if a planet move round the sun, say with a uniform circular motion, while the sun moves round the earth, also uniformly and circularly, what path will the planet actually trace out?

To get a notion of the possible species of curves, let us simplify the question by supposing a circle ABCD moving along a straight line ET, while a point moves round the circle from A.

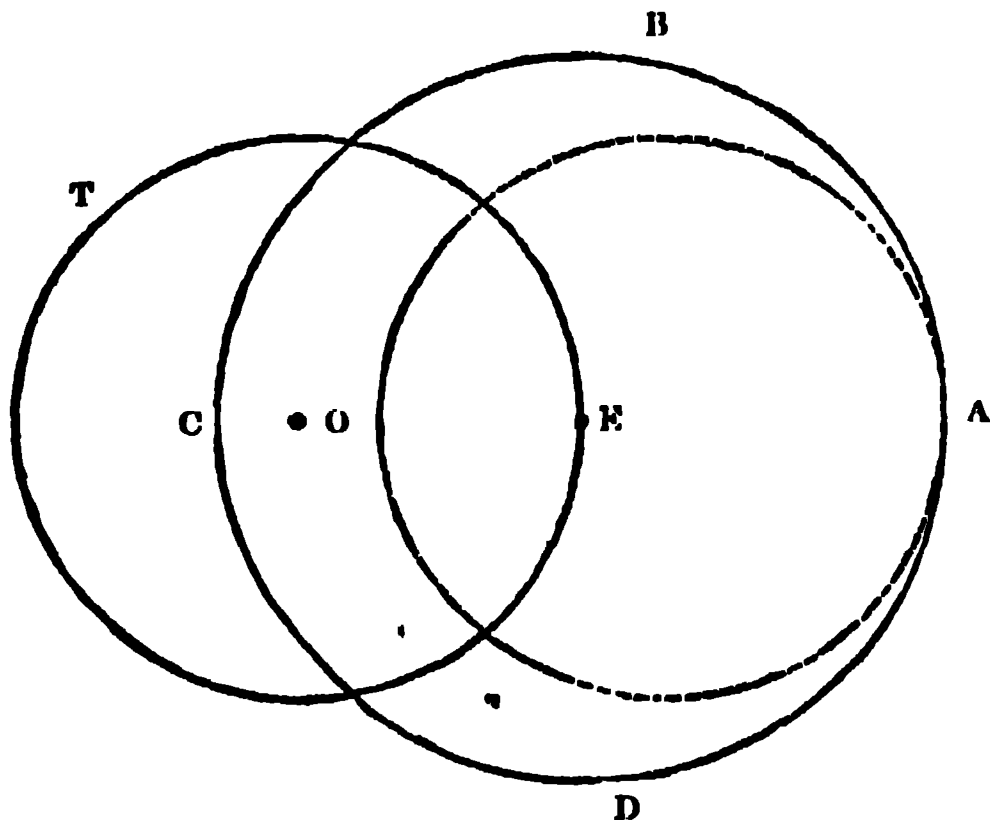
Fig. 6.



In the first place, if A did not move round at all, the line AG would be described; if A moved slowly round, the translation of the circle would cause an undulating curve like AHK to be described: if A moved as fast on the circle as the circle itself is moved forward, the undulation would be changed into a curve with cusps like ALG; while if A move faster on the circle than the circle is carried forward, the circle, so to speak, will not have time to get out of the way, and prevent the formation of loops, as in AMNMPQRQ.... The faster A moves, the larger and the nearer will be the loops, so that at length no one will be clear of the preceding and following, or the loops will interlace.

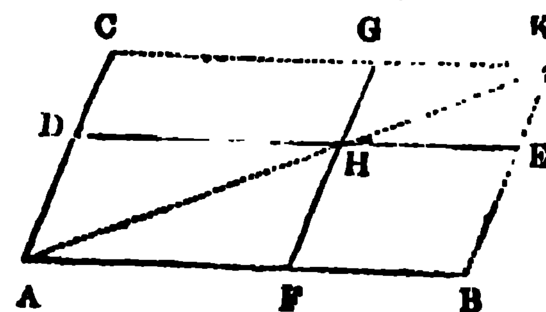
If the circle move round another circle, the same appearances will be presented in an inverse order. Let the centre E of the circle ABCD be carried round the circle ET, whose centre is O. If A did not move at all upon its circle, it would, by the motion of its circle, describe a circle (dotted) equal to ET: if A moved slowly, it would describe a succession of close loops enveloping O; if quicker, the loops would at last disengage themselves from each other; while for still more rapid motion of A the loops would become cusps, and afterwards the curve would simply undulate. The character of these curves will be further discussed under Trochoidal Curves, and their astronomical application under Planetary Motions. It is sufficient here to say that the apparent orbits of all the planets (or rather, the orbits as they would be if changes of distance were perceptible) are trochoidal curves of the above-described species, with loops which do not interfere with one another.

Fig. 7.



The composition of motion has been virtually proved in the preceding paragraphs, combined with the account of the second law of motion. [Motion, Laws of.] If causes of motion act instantaneously, one of which would make a body describe AB uniformly, and the other AC, *in the same time*, we find in the second law of motion that the body will move so that its distance from AB at the end of any time, measured parallel to AC, is what it would have been if the cause of motion in the direction AB had never existed nor acted. Suppose, for example, that three-fifths of the whole time of motion from A to B has elapsed; take AD three-fifths of AC, and the body must be then somewhere in the line DE. Again, take AF three-fifths of AB, and by the same law it follows that the body must be in the line FG, that is, it must be at the point H, which simple geometry shows to be on the diagonal AK, and by three-fifths of that diagonal distant from A. The same may be shown for any other proportion of the whole time; consequently the body, impressed with the two motions, describes the diagonal AK uniformly, and in the same time as that in which the separate motions from A to B, or from A to C, would have been performed. This is precisely the course the body would have taken in space, if, while it moved from A to B on the paper, the paper itself had taken the motion AC; but the establishment of the latter assertion must not be confounded with the proof of the composition of velocities impressed on matter; the latter requires those considerations which lead to the second law of motion.

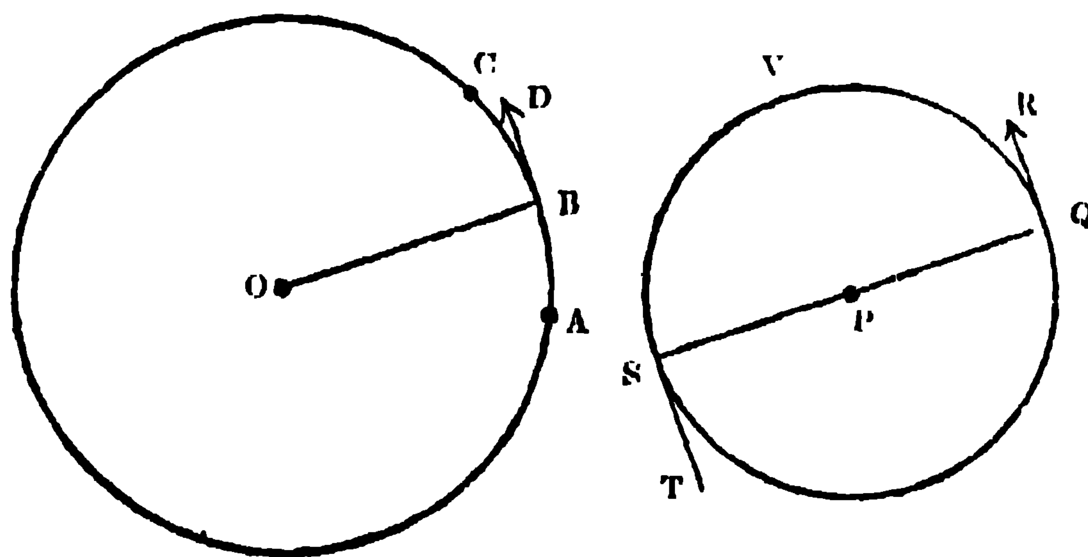
Fig. 8.



There are a great many uses of the word 'motion,' which are convenient, but require the introduction of arbitrary suppositions. Thus the moon never cuts the ecliptic twice running in the same place, and the intersection of her orbit with the ecliptic being called a node, it is said that the *node moves*; thus giving this node a sort of imaginary existence in the interval.

MOTION, DIRECTION OF. We have inserted this article, not for the sake of rectilinear, but of circular motion, the consideration of which is apt to cause some embarrassment to the beginner. In motion along a given right line there can be but two directions, in one or other of which the course must be; and these two directions are opposite to one another. But in circular or other rotatory motion, all imaginable directions are taken in the course of a revolution, and whatever linear direction the moving body takes at any one point, it has the opposite direction at the opposite point. Still however there are two ways of moving on a circle: the motion may either be from C to A through B, or from A to C through B. These are called, somewhat improperly, different directions of motion.

Fig. 9.



If two bodies be moving over two circles, they are said to move in the same direction when, two radii being taken in the same direction, the linear directions of motion are the same, as BD and QR. Thus care must be taken not to compare two circular motions by positions which belong to radii in opposite directions. If, for instance, the directions of motion be ABC and QVS (which are the same), and if at the same time the two bodies be at B and S, their linear directions of motion are opposite, though according to the definition their circular motions are in the same direction. Thus in the case of the moon, and her revolution round her own axis [Moon], the middle point of the visible moon is moving round the moon's axis in a direction opposite to the orbital motion of the moon; but the radius of that middle point is opposite in direction to the line joining the centres of the earth and moon; so that the direction of revolution of the moon's rotation is the same as that of the orbital rotation.

MOTION, LAWS OF. The laws of motion mean those universal methods of receiving and losing motion which close attention to mechanical phenomena, coupled with

strict inductive reasoning, has shown to be inherent in the constitution of matter.

If an intelligent observer, not used to inductive reasoning, nor instructed in the results of mechanics, were required to state the views which experience had taught him of the constitution of matter, as an agent or patient in the production or reception of motion, he would perhaps reply as follows: Matter seems to have no power of moving itself, though if we judge from the fall of bodies towards the earth, the phenomena of magnetism, &c., it would appear as if matter might be the cause of motion in other matter. And it seems moreover that motion is an accident of matter which diminishes and dies out of itself, if some sustaining cause be not perpetually in action; for in all cases in which the experiment can be tried, we find that moving bodies are reduced to rest by being left to themselves. The motions of the heavenly bodies, it is true, appear to be permanent; but we have no certain assurance that there is not a constant sustaining *physical* cause of this permanency.

There would be something of truth, and a good deal of falsehood, in the preceding conclusions, and it is not an easy thing to give that exhibition of the real constitution of matter which is placed beyond all doubt by the coincidence of its results with all the more complicated phenomena of nature. There is no question that those principles, to take two cases out of thousands, on which a ball can be projected almost unerringly to its mark from the mouth of a cannon, and the motions of the moon can be predicted within a small fraction of a second, are founded in truth; but it does not therefore follow that an *à priori* demonstration of them, mathematical or experimental, can be given; and in fact the method of presenting the laws of motion to a beginner is encumbered with serious difficulties.

We shall begin by the assumption that those laws of motion which are to be found in all works on mechanics are true; the reason for such assumption being, that if we take them for granted, and use them as the basis of a mathematical system of mechanics, all results of that system, however many the links in the chain of deduction, are found to agree with observed phenomena in species, and as nearly in magnitude as the various resistances and disturbances will allow. In astronomy and optics, phenomena have been predicted with all but geometrical accuracy, by deduction from principles which would certainly be false if the received laws of motion were false. In terrestrial mechanics, the number of instances is unlimited in which these laws lead to that near approximation to prediction which is fully as much as can be expected with our imperfect knowledge of data. Many hundreds of phenomena admit, upon these laws, of an explanation which, compared with that which they could receive from any others, is as easy as the hypothesis of the motion of the earth compared with that of its stability.

So simple are the laws of motion themselves, that many have supposed them to be necessary, in the same sense as when we say it is a necessary consequence of our conception of straightness that two straight lines cannot inclose a space. We shall mention this notion again presently: in the meanwhile we are in this situation, that while it is difficult, as a matter of reasoning, to disentangle the fundamental laws from the variety and complication of the phenomena in which their effects are exhibited, yet these laws themselves, when disengaged, are of that startling simplicity which disinclines the mind to receive them as the results of a train of deduction, and disposes it rather to think that it could have dictated them from its own previous conceptions.

It will make some difference in our method of seeking for these laws, whether we suppose the earth to be at rest or in motion. Now the decisive proofs of the motion of the earth, as it happens, are themselves derived from certain consequences of the laws of motion. [MOTION OF THE EARTH.] We seem then to be reasoning in a vicious circle; nor do we see any mode of escape except by establishing the truth of these laws, whether the earth be at rest or in motion. And the process will be, first to detect laws for which there is a high and almost overpowering degree of probability in their favour; next to appeal to the above-mentioned uniform truth of the results deduced from the assumption of such laws for the conversion of this high state of probability into one of absolute demonstration.

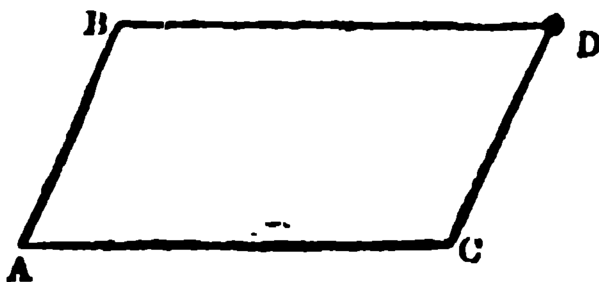
We will first assume the motion of the earth: every point of its surface then is in a state of revolution round the axis, while at the same time the whole is carried forward round the sun; to which we must add, the slight motion arising from the precession of the equinoxes, and the possible translation of the whole system. But this motion is very different in different parts; at the pole, for example, there is no diurnal motion, near it only a small one, and at the equator a considerable one. The points near the pole, all the motions considered, are describing a trochoidal orbit (p. 450), the undulations of which are small, and the rotatory velocity small; those near the equator make larger undulations, with greater velocity of rotation. Our first idea might be, then, that at the different parts of the earth some modification of general laws would be observed, arising from the difference of the motions of the several places. It would not surprise a person wholly unacquainted with mechanics, to whom the preceding facts were stated for the first time, if he were told that some mistakes were made in the pointing of guns in our Indian battles, arising from the artillerymen having been trained by officers who had learnt their art in the latitude of Addiscombe, near Croydon, in Surrey, and had forgotten to allow for the difference in the diurnal motion of the two countries. Now the first law of motion which we can establish (though usually called the *second*) arises from it never having been observed that any notice need be taken of the difference of place on the earth in estimating effects of motion. It is not found necessary to write different treatises on gunnery for different latitudes, nor to alter the disposition of parts in any machine moved from one latitude to another to produce a more advantageous effect. There is, it is true, a small diminution in the weight of bodies, as they are carried toward the equator, and [CENTRIFUGAL FORCE; PENDULUM] the results of this are apparent in experiments in which the acquisition of motion depends upon weight, or rather, upon its proportion to the quantity of matter. But this very problem of the pendulum is one in which the question of the truth of the laws of motion is established by a test which would detect the smallest quantities, and furnishes an answer to those who might say that the possible effects of the difference of diurnal motions, though not distinguishable in such cases as that of a cannon-ball, might be perceptible in delicate instruments.

If to the motion of the earth we superadd another, such as the motion of a carriage, the same sort of result is found. Those who move on a railroad at the rate of 30 miles an hour, or 45 feet in a second, do not find the relation in which they stand to the objects in the carriage in any degree changed by the motion. At the instant of taking the motion, or on any sudden jolt or change of motion, effects may be produced to which we shall frequently refer: but when the speed is once obtained, it is well known that a person might occupy himself in reading a work on mechanics written on *terra firma* (so called), and might verify all the experimental conclusions, without coming to any result which would remind him of the difference of state between the writer and himself, as to motion. Hence we are led to the conclusion that all the relations of matter to matter remain unaltered, if the whole system be made to move, provided that the same motion be communicated to all its parts. And though we do not, absolutely speaking, know what rest is, since no point of the earth, nor of any heavenly body, can be shown to be at rest, yet since we see that the relations remain unaltered when the velocity of a whole system is changed, we are led to conclude that the same laws which prevail when all the parts of a system have the same motion, would also prevail if the whole system were at rest; the ground of our presumption being, that the laws remain unaltered under any alteration of the common motion which it is in our power to make.

Let us now suppose that the carriage, instead of moving in a right line, is carried on a curved road, say a simple circle. It is no longer observed that loose objects in the carriage have a tendency to repose relatively to the carriage itself. If the motion become sufficiently rapid, or the friction of the substances on which they stand be sufficiently small, they will endeavour to move outwards, or from the centre of the circle of motion. This phenomenon can be made a consequence of the laws of motion, when the latter have obtained their simplest form; we do not at present enter into this subject further than to point out that it is only of rectilinear motions we can predicate any law as descriptive of what is inherent in matter. We have, it is true, already spoken of circular motions in taking into account

those of the earth; but it must be remembered, firstly, that the circles in question are so large, that a small arc of any one is nearly a straight line; secondly, that we *have* been obliged to advert to this tendency outwards, which is the reason of the diminution of weight (or of much the greater part of it) detected from the oscillations of a pendulum which is carried towards the equator.

This second law of motion (for such it is called, though it must be deduced first when the earth's motion is considered) may be thus stated:—If there be two or more causes of motion, taking place in two different right lines, whether inherent in the body or external to it, their effects do not interfere, nor does either diminish or augment the effect of the other. If, for instance, the body A be subject to two actions, one of which, being entirely in the



direction A B, would bring the body to B in a given time, and the other, entirely in the direction A C, would bring it to C in the same given time; then the body will move from A to D, precisely as it would have done if, moving along A B in the manner first specified, the line A B had been translated with its extremity A moving in the second manner specified, the said line AB not changing its direction.

The most simple and general method of stating this law is as follows:—The distance of a point from a straight line or plane, measured in any given direction, and as it will be at the end of a given time, is not affected by the action, during that time, of any causes of motion, provided they act in the direction of, or parallel to, that straight line or plane; or no force, in a given direction, can produce motion to or from a line in that direction. Thus if a ball were thrown up in still air, in such a manner that it would mount 50 feet in one second, no imaginable *horizontal* current or whirlwind, however much it might alter the actual course of the ball, would prevent its rising 50 feet in the second. The statement of the law by Newton, namely, that when a force acts upon a body in motion, the change of motion which it produces is in the direction and proportional to the magnitude of the force which acts, is perhaps rather too vague to give a distinct notion to learners.

From the law just enunciated, we may learn that bodies upon the earth, moving with the earth, have the properties of bodies at rest with respect to all motions that are to be estimated relatively to the earth: at least upon the supposition that the curvature of the motions of the earth is not sufficiently great to produce a sensible effect. We have then to inquire what is the natural state of matter on the earth? Can it preserve any motion of itself, or does every motion gradually slacken and die out, by the mere inability of matter to maintain it without the application of external causes? On this point we have only strong presumptions, which would be by themselves insufficient. Our first step would be to conclude, from what we actually see, that rest is the natural state of matter, and one to which it always approaches, however great a cause of motion be applied, unless that external cause, or some part of it, be maintained. On looking further however we find that terrestrial matter, immediately on its being put in motion, encounters causes of retardation. The resistance of the air, and the friction of the basis on which the substances rest, are easily shown to lessen the motion of bodies which encounter them. The more nearly these are removed, the longer does motion continue. It is certain then that these resistances contribute in a great degree to the destruction of motion; but it is not therefore to be immediately assumed that there is no other cause. If we grant that a perfectly smooth ball, lying upon an indefinitely extended plane without friction, and not in contact with any atmosphere, would move for a long time without any sensible diminution of the rate with which it was made to set out, we grant quite enough to explain all that we see, without the necessity of supposing that the motion would continue for ever. How then can we establish the first law of motion (so called), which is thus stated, that matter will retain its state of rest, or of motion, for any length of time, however great, until acted upon by some external cause? We must here appeal to the results of the application of this law, which have never, in any one instance, exhibited any reason to suspect that it is only approximately true. Throughout the long period of astronomical history, no one of the heavenly bodies has shown any diminution of its motion, or any of the consequences which would arise, if the motion had a tendency to wear itself out. We shall not here go into the details of these consequences; the conclusion is, that the state which matter, independently of external bodies, has been created capable of maintaining, is not merely rest, but also uniform motion in a straight line; so that it has no more tendency of itself to part with any of its velocity, nor to move slower or faster than it was first made to move, than it has to set itself from rest into motion. A great many, perhaps most, of the mistakes which have been made by writers against the Newtonian theory of attraction, have arisen from want of proper conception of the *neutral state* of matter. Maintenance of velocity and direction has been to them a proof of the existence of external causes maintained in action; whereas it proves nothing but that there was at some time or other an external cause which acted for a longer or shorter time: the external cause steps in when the velocity changes, or the direction, or both, and not till then.

Properly considered, the immense number of different states which matter retains, namely, either absolute rest, or any degree of velocity whatsoever, is as wonderful and mysterious a law as that of the attraction of matter upon matter, without any apparent intermediate agent. That matter should, without any perceptible maintainer, keep one rate of motion and one direction until acted on from without, is as difficult to admit, as that the mere presence of other matter should change that motion and that direction. What should teach blind atoms to draw straight lines in preference to circles or spirals? Have they the fundamental conceptions, according to some, or the powers of perception and inference, according to others, by which reasoning minds know or discover the simplicity of a straight line?

These two consequences of observation, namely, the law of its existence, by which matter can retain certain states, if no other matter interfere, and that by which it can change the state of other matter, its own at the same time undergoing another change, should never be allowed to be separated. There are two classes of philosophical speculators (for no religious question need be allowed to enter), whose system introduces no difficulty into the details of mechanical philosophy which did not enter into its principles. The first consists of those theists who look upon the maintenance of the creation to be the consequence of the same power as that which first created, and who consider that one moment's cessation of a sustaining power, of the same quality, so to speak, as the creative, would be the annihilation of all things: the second consists of atheists, who will of course find no more difficulty in the maintenance of the universe than in its first construction. But a great confusion of ideas is introduced into all fundamental questions which relate to matter, by the existence of a sect which we suspect greatly to outnumber either of the former two, and whom we may call believers in the *Creator* and not in the *Maintainer*. These, whatever they may think of the God of the moral world, imagine that the God of the material became inactive and quiescent as soon as matter was created, and endowed with certain powers, or made subject to certain laws. These laws, which are really their minor deities, carry on the business of the universe, and they can abstract the idea of God altogether from the continuance of the existence of matter, though not from its first creation. Among them may be found many of the literal interpreters of the Mosaic account [MOTION OF THE EARTH], who hold strictly that the Creator 'rested from his work,' and left matter to its 'laws,' except on certain rare interpositions. Many of this sect have admitted the laws of motion, and, among others, the power of matter to maintain its motion, because there was an appearance of inactive sameness, or want of change, in the permanence of rest, or permanence of direction and velocity. But they have been startled by the entrance of attraction, and have disputed its possibility on account of the absence of *second* causes sufficient for its explanation: however clearly it might be shown that all the results of attraction are present among phenomena, they would not allow their *first* cause to be awakened from the sleep in which it was their pleasure to suppose him plunged, so far as matter was concerned. Perhaps it is one

of the most singular mental aberrations which ever was manifested, that at the time of the appearance of the Newtonian doctrine, the first mechanical theory which rested on the *maintainer* of the creation, at least until (which has not yet happened) some good quiescent 'second' cause was discovered—that doctrine was frequently charged with atheism.

If the earth were supposed to be fixed, we might obviously (though not obliged to do so) begin from matter at rest, and establish first that law of motion which usually stands first.

The third law of motion was enunciated by Newton as follows:—'Action and reaction are equal and contrary;' which requires a definition, and this definition will require the statement of the principle, or something amounting to it, in a more definite form. We may readily suppose that when matter communicates to other matter motion which the latter had not before, the former must lose some of its own. On any other supposition, the connexion of matter with other matter would create motion. But this it would seem to do in the case of attraction, so that the *primâ facie* objection to the supposition of matter creating motion seems to be answered by an instance. It must however be observed that in every case of nature, the creation of motion by attraction is accompanied by the creation of an opposite motion. If a magnetic and non-magnetic needle be placed in water, not only will the magnetic needle move towards the other needle, but the other needle towards the magnetic needle. It appears then that opposite motions are to be considered as contrary effects; and, if applied to the same body, we know that they would destroy one another. In like manner then, as in considering the first law of motion, we have to learn that maintenance of uniform velocity must be looked at as inherent in matter, and as not arising from external causes; so in the third we are taught to consider opposite velocities as negations each of the other—so that the creation of both is equivalent to the creation of neither, and not, as might be supposed, requiring two new and distinct causes of motion. In like manner, if A were to lend a sum to B, which C was to stand engaged to repay, a credit and a debt would be created which did not before exist, the whole stock of the community remaining unaltered.

The most essential part of the principle however is derived from observation of the fact that, *cæteris paribus*, the more matter is moved, the more slowly is it moved. If the magnetic and non-magnetic needles be of equal mass, they will at the end of any time have equal and contrary velocities; but if the magnet be double of the other, it will in the same time acquire only half the velocity. In fact, confidently as we feel entitled to expect that, in some sense or other, action and reaction will be found equal and contrary, we have not learnt the meaning of the word action as long as we think only of velocity, and not of the quantity of matter in which velocity is created. A cause of motion once existing, and which was entirely expended in giving a velocity of 100 feet per second to a ball of two pounds weight, would have given 200 feet per second to a ball of one pound weight. Hence it is MOMENTUM which is the measure of the action of matter upon matter, and the definite enunciation of the third law is as follows:—Whenever any matter gains momentum in one direction, other matter either loses as much momentum in that direction, or gains as much in the contrary direction. Action then is creation or destruction of momentum; reaction is destruction or creation: while the destruction of momentum in one direction, and its creation in the contrary direction, are equivalent effects.

The absolute strictness of this law, probable as it is rendered by terrestrial observations, is proved in the same way as that of the others, namely, by the observation of the conformity of its legitimate deductions with observed facts. But the law being once admitted, its necessary consequences may be carried to a point startling to those readers who are not accustomed to consider any degree of minuteness which is undiscoverable by the senses. (See the remarks in ATTRACTION, vol. iii., p. 68.) Those who can comprehend that, if the law of attraction be true, a particle of snuff in a terrestrial snuff-box does its part (though but a small one) towards the maintenance of the motions of the solar system by its attraction of the particles in a Saturnian snuff-box (if the inhabitants of that planet be allowed such a luxury), will be able to comprehend that the earth itself feels (how slightly, we need not say) every motion which is made upon it. When Archimedes only wanted a point to rest his lever upon, in order to move the world, he little thought that his end could be gained by walking upon its surface, and that he made perhaps his strongest attempt when he hurried out of the bath to tell king Hiero of his new method of detecting the goldsmith's fraud. In walking forward upon the earth, which friction enables us to do, our feet obviously act upon it; and whatever momentum is communicated to ourselves, the same is lost by the earth, or gained in an opposite direction: and the same may be said of a person who jumps upwards. Thus the whole momentum of the universe, estimated in any one direction, obtained by taking the velocity of every mass in that direction, remains always the same, at least unless there be somewhere in the universe matter which obeys other laws than those of our system.

The three laws of motion, then, may be thus enunciated:—

1. Matter, unacted on by other matter, preserves the state which it had when action last ceased, that is to say, remains at rest, if it were then at rest, or if it were then moving, continues to move with the same velocity, and in the same direction. Rest, or uniformity of direction and velocity, can be maintained without the continuance of external action.

2. All force, or cause of motion, in any direction, produces its effect in that direction, and in no other; that is, the distance of a material point from any line, at the end of a given time, is unaffected by forces, whatever they may be, which act in that line or parallel to it.

3. Action of matter upon matter is evidenced by the creation of momentum, and measured, in any direction, by the momentum created in that direction: and action is always accompanied by equal and contrary reaction; that is, momentum is never created in any one direction, without a loss of the same momentum in that direction, or the creation of an equal momentum in the opposite direction.

Professor Whewell (to whose 'First Principles of Mechanics,' Deighton, Cambridge, 1832, we should particularly refer the reader, observing that the French writers are remarkably vague and indistinct in their treatment of the fundamental points of mechanics) has lately (*Camb. Phil. Trans.*, vol. v., part ii.) entered into the question 'On the Nature of the Truth of the Laws of Motion;' that is, whether they are '*necessary*, and capable of demonstration by means of self-evident axioms, like the truths of geometry, or *empirical*, and only known to be true by trial and observation, like such general rules as we obtain in natural history.' His conclusion is that there is a necessary and empirical part in each, as follows:—

	Necessary.	Empirical.
1.	Velocity does not change without a cause.	The time for which a body has already been in motion is not a cause of change of velocity.
2.	The accelerating quantity of a force is measured by the acceleration produced.	The velocity and direction of the motion which a body already possesses are not either of them causes which change the acceleration produced.
3.	Reaction is equal and opposite to action.	The connection of the parts of a body, or of a system of bodies, and the action to which the body or system is already subject, are not either of them causes which change the effects of any additional action.

From the preceding it will appear that the *necessary* part of each law is either a verbal proposition or disputable. To say that velocity does not change without a cause, is a reference to that permanent association of change with reason for change which habit derived from experience, if nothing else, would lead us to make in all cases, whether concerning motion or anything else: the law of matter is found in the empirical part. Again, the accelerating quantity of a force can mean nothing but the acceleration produced; for our only meaning of force is cause of motion or alteration of motion, and it is an identical proposition that the accelerating quantity of a cause of acceleration is measured by the acceleration produced. Thirdly, if in 'reaction is equal and opposite to action' we are to understand by action the production or alteration of MOMENTUM ($M \times V$), we do not

see the *necessity* of the proposition: while if it be merely understood that there is a somewhat which matter cannot give to other matter without itself losing the same, we may, as in the case of the presumed necessary part of the first law, deny that it is any peculiar property of *matter* which is stated. It is the mode of measuring this somewhat which makes this law have a specific meaning with reference to matter.

The mistakes into which philosophers fell upon the laws of motion are uninteresting except in the applications which were made of them; and in the article MOTION OF THE EARTH will be found enough of these to give an idea of the difficulties which such fallacies placed in the way of sound knowledge. A full account of the labours of Galileo is accessible to all in the life of that great man, published in the 'Library of Useful Knowledge.' For an account of the notions of Descartes on the same subject, see VORTICES. The first distinct enunciation of these laws appears in the Principia of Newton, since whose time they have been usually quoted in their present form and number.

Though all mechanical problems admit of solution upon the assumption of these laws, in conjunction with those which may be called the distinctive properties of the solid, fluid, and gaseous states, yet the purposes of mechanical inquiry are better served by certain general principles deduced from them, the proper conception of which can only be made by mathematicians, and are therefore referred to a purely mathematical article [VIRTUAL VELOCITIES]; see also PRESSURE, FORCE, INERTIA, CENTRIPETAL AND CENTRIFUGAL FORCES, ACCELERATION, VELOCITY, &c.; MOVING FORCE; particularly the article INERTIA, for the reason of the non-introduction of that word.

Among the many absurdities which have arisen out of a misapprehension of the laws of motion, is the attempt to discover what is called a *perpetual motion*, or a machine which of itself would never stop. The earth and planets are such machines in their rotations on their axes; and we have seen that any particle of matter, unacted on by other matter, and once in motion, is a perpetual motion. If a wheel attached to an axle could be deprived of friction at the pivots, and enclosed in a permanently air-tight and perfectly exhausted receiver, it would also, when once in motion, be a perpetual motion. But as long as any friction or resistance, however small, is perpetually retarding the motion, it is obvious that the velocity, if maintained, must be indebted to some external supply of moving power. To take the case of friction, which arises from the roughness of the supports, and which, independently of *adhesion*, may be considered as a rapid succession of very small jolts, by which the roughnesses of the one surface strike upon those of the other, and communicate a portion of momentum to the frame, and finally to the earth: to suppose that a wheel as above described could go on for ever, with friction, would be to suppose that there could be action without reaction. In fact, a perpetual motion, such as is intended to be made by the speculators on the subject, is nothing less than a machine which will work for ever without new moving power; it being not one bit less absurd to suppose that it would perpetually overcome friction and atmospheric resistance, than that it would continue to supply the impetus necessary to carry on the sawing of a plank or the weaving of lace.

MOTION OF THE EARTH. The theory of gravitation has placed this question on a footing entirely different from that on which it was argued, whether by Aristotelians or Copernicans. Both of the latter parties supposed the existence of a fixed central body somewhere, which the first of them would have to be the earth, and the second the sun. This *centrum mundi*, or centre of the universe, is exploded, and with it all the systems, whether Ptolemaic or Copernican, which preceded the discoveries of Newton. But, as already noticed in COPERNICUS, the existing system preserves the name of that great man; the reason being, that its distinctive peculiarity is retained relatively, if not absolutely, namely, that the planets all move round the sun, or round a point near to the sun. But it is added to the real Copernican system, that sun, planets, and all, may be, and probably are, in motion; the translation, as it is called, of the whole system being very nearly rectilinear, and the curvature, if any, arising from the attraction of the fixed stars. Nothing but a long course of observation can settle this last part of the question.

In approaching the old controversy on the motion of the earth, we confine ourselves rather to the arguments by which it was opposed than to those by which it was supported. For this we have two reasons: firstly, that the latter are well known and extensively circulated, while the former, unless preserved in historical articles, will find the oblivion from which they have no intrinsic merit to rescue them; secondly, that the controversies of the present day may be usefully illustrated by recurring to the long-decided struggle between the Copernicans and their opponents. We have now among us those who would fetter all *new* truths by *their* interpretation of the Scriptures, though they quietly acquiesce in the defeat which their own principle formerly received. The charges still brought against the cultivators of the sciences, 'to the distress and disgust of every well-constituted mind,' as Sir J. Herschel expresses it, should be looked at, not as the honest manifestations of an alarm newly awakened by the circumstances of the present day, but as the effects of an abiding spirit, which has always opposed investigation, and which, if it had prevailed, would have smothered all the knowledge of nature which has been acquired in the last two centuries. If some of those who have constituted themselves successors of the cardinals who forced Galileo to recant, have learnt from the past history of their own cause, and from the temper of the present age, to show the real scope of their system less openly than it appeared in the seventeenth century, the compliment which they thus pay to the advancing intelligence of mankind, though received with thanks and highly appreciated, should not be accepted as an equivalent for the mischiefs which must result from a successful attempt to place the great question of Revelation upon a false basis. The case of those who now endeavour to impede the progress of geology is so similar in its fundamental points to that of the former labourers to the same effect in the field of astronomy, that the circulation of some account of the latter will perhaps enable our readers to help themselves in forming their opinion of the former.

When the work of Copernicus appeared in 1543, it seems to have been considered as a mere attempt to demonstrate (see the old use of this word in DEMONSTRATION) the motions of the heavenly bodies in a more simple way. Guarded as it was by the expressions of the preface, it was neglected as a purely speculative trial of a strange and impossible hypothesis. In 1566 Ramus (*Scol. Math.*) simply reproaches Copernicus with the gigantic character of his hypothesis, and says it would have been better to have taken one nearer to the truth, in a manner which implies that he thought both were agreed as to what the truth really was. Copernicus himself, as we have seen, treated his own ideas as a reproduction of those of the antients, and in truth the existence of such a doctrine as the earth's motion was perfectly well known to all men of learning. Aristotle (in his second book on the Heavens) states that Pythagoras and his followers placed the sun in the centre, on account of the superior excellence which they attributed to the element of fire, of which they supposed the sun to be made. Different authorities give the same opinion (whether with or without the reason) to Philolaus, Anaximander, Nicetas, Seleucus, Cleanthes, Leucippus, Ecphantus, Heraclides Ponticus, and Aristarchus. The introduction of Pythagoras, as a predecessor of Copernicus, is as rational as would be the connection of the modern atomic theory with the doctrines of Epicurus; and much of the same kind is an assertion not unfrequently made, that Cardinal Cusa was a supporter of the earth's motion. This writer (*De Doctâ Ignorantiâ*, lib. ii., c. 11) certainly denies that there can be any centre of the universe; for, says he, if there were a centre, there would be a circumference, that is, a termination, to the universe: and his reasons relative to the earth's motion are of the same degree of force. He is more rational in the next chapter, where he explains that the apparent motion of other bodies may be that of the spectator. Riccioli cites a sermon of Cusa, which proves, says he, that the cardinal had come to a sounder opinion; for he speaks of God's angels or intelligences moving the sun and stars. Nothing can better illustrate, in our opinion, the arguments against Riccioli and his predecessors: when the cardinal is writing for men of science, he advances, after his fashion, the doctrine of the earth's motion; when he is writing excitations (not exercitations, as Riccioli says) to religious feeling, he speaks of God's works in a manner which persons in general understood: in confounding the preacher of religion with the philosopher, Riccioli made the usual error of his day,

and only repeated his own mode of treating Moses, Isaiah, and the writer of Job. But it would have been better to have argued by analogy, that if either of the latter had written a professedly philosophical work, he might, whatever appears to the contrary from his religious writings, have admitted the motion of the earth.

Copernicus had no predecessor as a mathematical reasoner upon the question. The first continental followers of the new system were Rheticus, Reinhold, Mœstlinus the instructor of Kepler, and Urstitius, who was probably the instructor of Galileo. In 1556 appeared in England the 'Castle of Knowledge,' by Recorde [Recorde, Robert], in which a cautious and implied avowal of Copernican principles is made, and also the Ephemeris of John Field, expressly computed from Copernicus and Reinhold. John Dee and his pupil Thomas Digges (son of Leonard) were both avowed Copernicans: the first absolute defence of the system is contained in the appendix to the 'Prognostication Everlasting,' &c. of Leonard Digges, republished by Thomas Digges (who added the appendix) in 1594. This appendix is called 'A Perfit Description of the Cœlestial Orbes, according to the most Ancient Doctrine of the Pythagoreans; lately reuiued by Copernicus, and by Geometricall Demonstrations approued.' We shall quote from this work the account (in modern spelling) of 'what reasons moved Aristotle and others that followed him to think the earth to rest immoveable as a centre to the whole world.'

'The most effectual reasons that they produce to prove the earth's stability in the middle or lowest part of the world is that of Gravity and Levity. For, of all other, the element of the earth (say they) is most heavy, and all the ponderous things are carried into it, striving (as it were) to sway even down to the inmost part thereof. For the earth being round, into the which all weighty things on every side fall, making right angles on the superficies, pass to the centre, seeing every right line that falleth perpendicularly upon the horizon in that place where it toucheth the earth, must needs pass by the centre. And those things that are carried toward that medium,' or middle point, 'it is likely that there also they would rest. So much therefore the rather shall the earth rest in the middle, and (receiving all things into itself that fall) by his own weight shall be most immoveable. Again, they seek to prove it by reason of motion and his nature; for of one and the same simple body the motion must also be simple, saith Aristotle. Of simple motions there are two kinds, right and circular: right are either up or down; so that every simple motion is either downward toward the centre, or upward from the centre, or circular about the centre. Now unto the earth and water, in respect of their weight, the motion downward is convenient to seek the centre; to air and fire, in regard of their lightness, upward and from the centre. So it is meet to these elements to attribute the right or straight motion, and to the heavens only it is proper circularly about this mean or centre to be turned round. Thus much Aristotle. If therefore (saith Ptolemy of Alexandria) the earth should turn but only by that daily motion, things quite contrary to these should happen. For his motion should be most swift and violent, that in twenty-four hours should let pass the whole circuit of the earth; and those things which, by sudden turning, are stirred, are altogether unmeet to collect, but rather to disperse things united, unless they should by some firm fastening be kept together. And long ere this the earth, being dissolved in pieces, should have been scattered through the heavens, which were a mockery to think of; and much more beasts and all other weights that are loose could not remain unshaken. But also things falling should not light on the places perpendicular under them, neither should they fall directly thereto, the same being violently in the meanwhile carried away. Clouds also and other things hanging in the air should always seem to us to be carried toward the west.' In his answer to the preceding, Digges propounds the experiment which was afterwards urged (by those who had not tried it) against Copernicus, as follows: 'Of things ascending and descending in respect of the world, we must confess them to have a mixed notion of right and circular, albeit it seem to us right and straight, not otherwise than if, in a ship under sail, a man should softly let a plummet down from the top along by the mast even to the deck: this plummet passing always by the straight mast seemeth also to fall in a right line; but being by discourse of reason weighed, his motion is found mixed of right and circular.' From his preface Digges appears to have considered magnetism as the cause of the earth's self-sustaining power; an opinion carried further by Gilbert (the next English Copernican) in 1600, who, in his book on the magnet, endeavours to deduce the earth's motion from magnetic causes, as well as the precession of the equinoxes.

Hitherto the theological part of the controversy has not made its appearance. We must date this view of the question from the discoveries of Galileo. Neither in antient nor modern times have those who would bind over the sciences to agree with *their* interpretation of the Scriptures ever taken alarm at hypotheses, until those hypotheses began to have facts in their favour. The inconsistency is worth noting; for taking these objectors on their own principles, there may be impiety (if the Bible be a revelation of philosophy) in propounding a theory which contradicts it; but there can be none in stating the results which follow from actual investigation: the thoughts of the mind of man may contradict revealed science (if such there be), but the works of the God of nature can hardly detect falsehood in the God of revelation. It was Copernicus then, and not Galileo, who was the heretic, if heresy there were in the case; but the former and his immediate disciples slept in peace, while the latter was forced to sign a recantation. The story of Galileo is so well known, from the party use which has been made of it amongst us, as well as from the excellent account of Mr. Drinkwater (Bethune) in the 'Library of Useful Knowledge,' that it is unnecessary to go into details. It has been a severe lesson to the Roman Catholic church to beware of bringing its infallibility to the practical test of a declaration in philosophy. We say the Roman *church*, for though admitting that the seven inquisitors who signed the indictment against Galileo are not to be regarded, upon the principles of that church, as a final authority, yet the sufferance of their decision for two centuries must be construed as the act* of a church which is jealous above all others of what is taught or done by its ministers. The Minims Le Seur and Jacquier knew better than we can do in what state the doctrine of the earth's motion was left† by the process; their declaration at the commencement of the third book of their edition of Newton (1742), runs as follows: 'Newton in this third book assumes the hypothesis of the motion of the earth. The propositions of the author cannot be explained otherwise than by making the same hypothesis. Hence we have been *obliged to put on a character not our own.* (Hinc alienam coacti sumus gerere personam.) But we profess obedience to the decrees promulgated by sovereign pontiffs against the motion of the earth.' At the same time, with reference to the reproaches heaped upon the whole body of Roman Catholics for this persecution of Galileo, we heartily wish that all persecutions, Catholic and Protestant, had been as honest and as mild. There is no reason to doubt the perfect good faith of the whole proceeding: and, remembering that the tribunal was one of which Galileo himself admitted the jurisdiction, and supposing the inquisitors to have believed they were doing their duty, any less amount of severity would have been a palpable respect of persons (for Galileo had powerful friends). For ourselves, we would as soon have been among the inquisitors as in the position of Galileo himself, if it be true that, on rising from his knees, after taking the most solemn oaths that he 'abjured, cursed, and detested' the doctrine of the motion of the earth, he repeated aside to a friend, '*E pur si muove*' ('It does move, for all that'). We may pity, but cannot admire, either party. Not to leave unsaid any palliative on either side, we may state that the exclamation of Galileo has no very good authority, and that the inquisitors themselves were not unanimous. One of them, the cardinal Bentivoglio, states in his memoirs, that he did all he could to prevent the decision. It should also be noticed that the prohibitions issued at the time were mostly against works written in Italian; we cannot help suspecting that the opinion would have remained unassailed if it had been ex-

* The Papal power must, upon the whole, have been moderately used in matters of philosophy, if we may judge from the great stress laid on this one case of Galileo. It is the standing proof that an authority which has lasted a thousand years was all the time employed in checking the progress of thought. There are certainly one or two other instances, but those who make most of the outcry do not know them.

But the most amusing application of the case before us is that frequently made by the unknown writers who publish their own great discoveries. These generally cite the *persecution* of Galileo as a parallel to the *neglect* of themselves.

† Mr. Drinkwater states that both Copernicus and Galileo remain in the Index Expurgatorius for 1828 with 'nisi corrigatur' to each. It appears however that the omissions and alterations with which the former author was allowed to be read were settled in 1620.

pressed only in Latin. The question just discussed was settled June 22, 1633, but this was not the beginning of the controversy. The following list of writings will save future reference. They are headed by their dates:—1614, Scheiner, 'Disqu. Math. de contr. et novitat. Astron.;' 1615, Foscarini, 'Epistola Italica de mobil. terræ;' 1615, Luniga, 'Lett. sopra l'opin. del Copernico;' 1616, Cruger*, 'Disput. de quot. telluris revol.;' 1618-1622, Kepler, 'Epit. Astron. Copern.;' 1619, Lansberg (Philip), 'Comm. in motum terræ;' also tracts of Ursinus, Campanella, and Godenius; 1619, Fienus, 'Disp. an Cœlum moveatur et terra quiescat.;' 1631, Morinus, 'Famosi et antiqui problematis de telluris motu et quiete hactenus optata solutio;' 1631, Fromondus, 'Antaristarchus, sive Orbis terræ immobilis;' 1633, Galileo, 'Dial. sopra i due massimi sistemi del mondo, Tolemaico e Copernicano,' the prohibited work; 1633, Lansberg (James, son of Philip), 'Apol. comment. Phil. Lansberg in motum terræ;' 1634, Morinus, 'Resp. ad J. Lansberg Apolog.;' 1634, Rosse, 'Confut. opin. Lansbergii;' 1635, Linemann, 'Disput. math. adstruens mot. diurn. telluri vindicandum esse;' 1638, Wilkins, 'Discourse tending to prove that 'tis probable there may be another habitable world in the moon;' 1638, Bouillaud, 'Philolaus, sive diss. de vero syst. mundi;' 1640, Licetus, 'De terra, unico centro motus, disp.;' 1640, Wilkins (anonymous), 'A Discourse tending to prove that 'tis probable the earth is one of the planets;' 1642, Gassendi, 'Epistolæ duæ de motu impresso a motore translato;' tracts of Deusingius, Morinus, and others; 1643, Morinus, 'Alæ telluris fractæ, contra Gassendum;' 1643, Claramontius, 'Antiphilolaus;' 1644, Polaccus, 'Anticopernicus Catholicus;' 1645, Rheita, 'Oculus Enoch et Eliæ' (defence of the Tychonic system); 1645, Bouillaud, 'Astronomia Philolaica;' 1645, Christian, 'Disput. de trip. mundi system.;' 1645, Grandamicus, 'Nova Demonstr. immob. terræ ex virtute magnetica;' 1646, Rosse, 'The New Planet no Planet,† or the Earth no Wandering Star, except in the wandering heads of Galileans' (answer to Wilkins); 1647, Gassendi, 'Institutio Astronomica;' 1649, Gassendi, 'Apol. in Morini lib. cui tit. Alæ telluris fractæ una cum tribus Galilei Epistolis de Conciliatione Sacræ Scripturæ cum systemate telluris mobilis;' 1651, Riccioli, 'Almagestum Novum;' 1653, Dubois, 'Dialogus Theologico-astronomicus;' 1655, Herbinius, 'Examen Controv. famosæ,' &c.; 1656, anonymous, 'Demonstr. math. ineptiarum J. Dubois;' 1665, Fabri, 'Dial. phys. in quibus de motu terræ disputatur;' 1668, Riccioli, 'Argomento fisico-matematico contro il moto diurno della terra;' 1680, Bianchini, 'Dial. contro il syst. Copern.;' 1682, Megerlinus, 'Syst. Mundi Copern. demonstr.'

The controversy ceases to have any interest after the publication of the Principia of Newton. Even to this day, we believe there are some who deny the earth's motion, on the authority of the Scriptures, and every now and then a work appears producing mathematical reasons for that denial; these works, as fast as published, after making each two converts and a half in a country town, are heard of no more until fifty years afterwards, when they are discovered by bibliomaniacs bound up in volumes of tracts with dissertations on squaring the circle, and perpetual motion, and pamphlets predicting national bankruptcy.

We shall now recapitulate some of the arguments against the earth's motion, taking first the scriptural and afterwards the physical.

The scriptural arguments are of two kinds, Copernican and anti-Copernican, for it must be remembered that the asserters of the earth's motion, almost with one accord, admitted the Scriptures as a judge of the controversy. The following are some of the texts and arguments. We take them from Fienus, Fromond, Morin, Rosse, and Riccioli on the one side, and from their statements of their opponents' arguments, or from Wilkins, on the other.

Psalm xix., 4, 5, 6: 'In them hath he set a tabernacle for the sun, which is as a bridegroom coming out of his chamber, and rejoiceth as a strong man to run a race. His going forth is from the end of the heaven, and his circuit unto the ends of it.' Here it is remarked that the metaphor, where it exists, is explicit, in '*as* a bridegroom,' '*as* a strong man,' but that the words which apply to the sun's motion are absolute assertion.

Ecclesiastes i. 4, &c.: 'One generation passeth away, and another generation cometh; but the earth abideth for ever. The sun also ariseth, and the sun goeth down, and hasteth to his place whence he arose. The wind goeth towards the south, and turneth about unto the north.' In the Vulgate, the last sentence refers to the sun. 'Oritur sol et occidit, et ad locum suum revertitur, ibique renascens gyrat per meridiem, et flectitur ad aquilonem.'

Joshua, x. 12: 'Sun, stand thou still upon Gibeon, and thou, moon, in the valley of Ajalon. And the sun stood still, and the moon stayed.... So the sun stood still in the midst of heaven, and hasted not to go down about a whole day.' It was contended that the earth ought to have been made to stand still, 'if Joshua had been a Copernican.'

2 *Kings*, xx. 11: 'And he brought the shadow ten degrees backwards, by which it had gone down in the dial of Ahaz.' *Isaiah*, xxxviii. 8: 'So the sun returned ten degrees, by which degrees it was gone down.'

Psalm xciii. 1: 'The world also is stablished that it cannot be moved.' *Psalm* civ. 5: 'Who laid the foundations of the earth, that it should not be removed for ever.'

Job, ix. 6, &c.: 'Which shaketh the earth out of her place, and the pillars thereof tremble: which commandeth the sun, and it riseth not, and sealeth up the stars.'

Job, xxxviii. 4, &c.: 'Where wast thou when I laid the foundations of the earth? .... Whereupon are the foundations thereof fastened? or who laid the corner-stone thereof? .... Where is the way where light dwelleth? and as for darkness, where is the place thereof?'

The Copernicans cited the preceding, *Job*, ix. 6, and the following, *Psalm* xcvii. 4, 'The earth saw, and trembled;' and *Psalm* xcviii. 7, which, in the English version, is 'Let the sea roar, and the fulness thereof, the world, and they that dwell therein;' but in the Vulgate, 'Moveatur mare et plenitudo ejus, orbis terrarum, et universi qui habitant in eo.' The Ptolemaists replied, with reason, that these texts evidently imply a violent and unusual motion, while all the others speak of stability as the common order of things. We look upon Fromond as, next to Riccioli, the most learned and sensible of the anti-movement party, while Lansberg is certainly not the least of the Copernicans. Yet the latter, to fill up the immense void between Saturn and the fixed stars, states that it is crowded with spirits good and evil, employed in their vocations: the former meets him by the following argument. By the universal consent of theologians, hell is at the centre of the earth: the creed says that Jesus Christ 'descended into hell;' and St. Paul, in *Ephesians*, iv. 9, that he 'descended into the lower parts of the earth.' The empyreal heaven, and the habitation of the blessed, must be as far as possible from hell; but the former was, by consent of theologians, at the circumference of the universe; therefore, says Fromond, the earth must be at the centre. But Morinus outdoes the rest. From the creed, he says, it appears that Jesus Christ 'ascended into heaven;' and from the first chapter of *Acts*, that he was 'taken up.' It is generally thought that the hour of the ascension was noon, at which time, according to the Copernicans, the heads of persons on the earth are towards the centre of the system (the sun). Consequently it was not an ascent, but a descent, for to go towards the centre is to descend. I know, says Morin, that the Copernicans have a subterfuge and a fallacy, for they say that the ascent was an ascent with respect to the earth only; and he goes on to show what shuffling knaves they were, for so direct a perversion of plain words. It is however but fair to the anti-Copernican party to add that Riccioli, by far the most learned of all of them, has not thought Morinus worthy of one word of mention in his list* of writers on the subject.

Riccioli cites the following additional texts. *Genesis*, xv. 12; 'And when the sun was going down,' &c. *Gen.*, xix. 23: 'The sun was risen upon the earth.' *Gen.*, xxxii. 31: 'The sun rose upon him.' *Judges*, xix. 14: 'The sun went down upon them.' *Matthew*, v. 45: 'He maketh his sun to rise on the evil and on the good:' with several

* The Preceptor of Hevelius.

† Lalande gives a Latin title; we do not know whether it was published in Latin at the same time or not.

* Since then this is a list selected by the latest writer of note, as well as the most learned, it may be worth while to give the names.

Copernicans: Copernicus, Rheticus, Moestlinus, Kepler, Rothman (until he followed Tycho), Gilbert Foscarini, Zuniga, Bouillaud, Lansberg, Herigone, Gassendi, Des Cartes.

Anti-Copernicans: Aristotle, Ptolemy, Theon, Regiomontanus, Alfraganus, Cleomedes, Macrobius, D'Ailly, Buchanan, Maurolico, Clavius, Barocius, Neander, Telesius, Martinengus, Lipsius, Scheiner, Tycho, Tassonus, Claramontius, Inchofer, Fromondus, Lagalla, Tanner, Bart. Amicus, Rocco, Mersenne, Polaccus, Kircher, Spinellus, Pineda, Lorinus, Mastrius, Bellutus, Pontius, Delphinus, Elephantutius. Many of these are theologians only.

others to the same purport. Also *Psalm* lxxv. 3: 'The earth and all the inhabitants thereof are dissolved: I bear up the pillars of it.' He adds all the places in which 'heaven above' and 'earth beneath' are mentioned.

The Copernicans, besides the very few passages which they could find alluding to a motion of the earth (and that only an unusual one), brought forward texts in which admitted errors exist; such as the Mosaic definition of the firmament, the circumference of Solomon's brazen sea (which, the diameter being ten cubits, must have been upwards of thirty-one cubits in circumference, and not thirty, as stated), and the like. To this the general answer was, that there is a great difference between stating round numbers, according to usual measurement, and absolutely asserting untruth. Riccioli however lays it down that the obvious literal sense of the Scripture is to be taken, except where it is manifestly false; that Archimedes had shown the proportion of ten to thirty to be false, but that no one had actually shown the earth to move. This was evidently convenient, but unfair; the motion of the earth was the thing in question, and could not be proved false by assuming a literal interpretation, which, it was admitted, might be rejected if the earth's motion were true.

Upon a review of the passages cited, it is clear enough that, if there be any astronomical system at all in them, it is that of an immoveable earth and a moveable sun; while if there be no astronomical system, it follows that vulgar notions are adopted in the modes of expression, which represent appearances without reference to their truth or falsehood. On one horn or other of this dilemma, all our modern Urbans must be content to abide: will they go back to Ptolemy, or forward with the advance of science? Can they show any reason why the astronomical system of the Old Testament should be rejected, and those passages which appear to favour one geological theory rather than another should not only be received, but be attempted to be enforced upon others by clamours of latitudinarianism, infidelity, and all those reproaches by which (and fortunately, by which only) untolerated differences of opinion are punished?

That the attempt to enforce a system of science derived from an interpretation of the Scriptures will signally fail, should be taught by the history of the past. Not even the Church of Rome will ever again dictate on a question of fact, and in Protestant countries (and Catholic too, we suspect) public opinion must and will support absolute proof against doubtful interpretation. The opponents in this matter are, some of them men of learning, like Fromond and Riccioli; others men of conceits, like Morin.* The former seize the stronger parts of their own case, but they will find that it requires a better foundation than imposition of interpretations to bear the sort of support which the latter afford. A compact college of cardinals might more safely make the attempt than a miscellaneous party.

The declining days of what was called the Aristotelian philosophy had their span much shortened by the glaring light into which it was thrown when held up against the results of the philosophy of Galileo; and this not more by the exhibition of the Ptolemaists than of their opponents the Copernicans. The latter were taught that rational mechanics must precede simple astronomy; and it is no exaggeration to say that not an inconsiderable portion of that power over nature which we now have, can be traced in its earliest growth to the necessity of finding stronger weapons to oppose the old system than were forged in the philosophical workshops of the age we have been considering.

The physical arguments of the time consisted much in supposing inclinations, propensities, and almost feelings of privilege and place, to exist in different sorts of matter. A comet, says Fromond, is 'not such an obscene ape of the planets that nature should have manufactured a sphere and a heaven for it to revolve in;' and the proper pride of a comet was the sufficient reason for one motion rather than another. The arguments for the sun's motion and the earth's stability may be condensed as follows. Aristotle and Ptolemy assert it; the Scriptures assert it (Fienus puts them second); the heavenly bodies are made for man, and the servant comes to his master, not the master to the servant; the natural motion of earthly bodies (as when falling) is in a right line; a body cannot have two natural motions, therefore the earth cannot move in a circle; if the earth moved, an arrow shot upwards could not fall on the spot from whence it was shot; the air, differing from the earth in substance, cannot be moved at the same rate, consequently, mountains, towers, &c., would produce a wind if the earth moved: a stone let fall from a height would not fall directly under the point which it leaves; an arrow shot towards the east would go much farther than one shot toward the west, the first having the air with it, the second against it; houses, and the earth itself, would be broken to pieces by so rapid a motion, which however the heavens can bear, being made of iron, *according to Homer*, while the earth is soft and friable; the immensity of the distance which must exist between the orbit of Saturn and the fixed stars, if the whole orbital motion of the earth produce no effect upon the latter: the excessive greatness of the fixed stars on the same supposition; &c. &c.

The Copernicans contended generally for the greater simplicity of their system, and the incredibility of the enormous velocity which the sphere of the fixed stars must have if the Ptolemaic hypothesis were true: to which it was answered, that God 'doeth great things past finding out, and wonders without number;' that the earth would corrupt and putrefy without motion, whereas the heavens are incorruptible: answer—that wind, &c. give sufficient motion; that the most moveable part of man is underneath, since he walks with his feet; whence the most unworthy part of the universe (which all parties called the earth) should be moveable: answer, that the Copernicans were absurd (as in fact they were) for taking the earth *out of* the centre of the universe upon an argument the force of which was derived from its being *in* the centre (or lowest part); also, which is theoretically true, that, if the earth move, the head of a man moves faster than his feet; that rest is nobler than motion, and ought therefore to belong to the sun, the nobler body: answer, that for the same reason the moon and all the planets ought to rest; that the lamp of the world ought to be in the centre: answer, that a lamp is frequently hung up from a roof to enlighten the floor; that there is a cause of motion (magnetism) in the earth: answer, that no Copernicans had examined the sun, or they might perhaps have found as good causes of motion there; that the Hebrew word for the earth has a root which signifies motion—which on the other side was contended to apply to the motion of animals upon its surface.

Such were the more common arguments of the Copernicans; others may be seen in a paper entitled 'Old Arguments against the Motion of the Earth,' in the 'Companion to the Almanac for 1836.' We do not charge every one, either of the Ptolemaists or Copernicans, with all the absurdities above noted; but we have not found one of either side free from such *à priori* attempts at a knowledge of the nature of things. Our countryman Bishop Wilkins has less of this sort of argument than any one except Galileo, and he deals with the scriptural objections in a very learned and able manner. He points out the absurdities into which the Fathers had fallen by a degree of literal interpretation which had become obsolete even in the days of Fromond: how, for instance—Basil made the moon greater than any of the stars, because Moses calls the sun and moon the two greater lights; Justin Martyr and several others supposed a vast body of water above the starry firmament; St. Augustin concludes the visible stars to be innumerable; many fathers assert that the heavens are not round, but stretched forth as a curtain; some that the sea not overflowing the land was not a consequence of the usual laws of matter, but a perpetual miracle; some that the sea is higher than the land, because it is called 'altum,' translated by us 'the deep;' some that the earth is placed upon the sea; some say that the stars have understanding and speech, and, according to Origen, moral responsibility. All these things follow, either at once, or by the most universally admitted species of inference, from the literal signification of words in the sacred Scriptures. These interpretations vanished first; those who sailed round the world destroyed the greater number of them; and the abandonment of them was acquiesced in even by those who would have nailed the earth to a Hebrew word. The earth itself was next allowed to move, when Galileo had established a mechanical system which would reconcile such motion with terrestrial phenomena, as completely as that of Copernicus

* This worthy, to a great capacity for finedrawn deduction, added the power of an astrologer, and some art in extricating himself from the scrape of an unfulfilled prophecy. When Gassendi remained alive after the time which Morin had positively fixed for his demise, the latter persisted that the non-fulfilment of the prophecy was in consequence of the warning which it gave Gassendi, whose health was declining, to try change of air.

and Kepler with celestial. The time came when even divines might insist on this simplicity of motion in illustration of the wisdom of the architect. But the structure of the earth had not been examined; consequently when the conclusions of geological induction began to appear, the old method was ready, the texts were forthcoming, neither was interpretation wanting, nor those who would raise an outcry against the results of examination and the investigators, because the former would not agree with the interpretation, nor the latter be fettered by its imposition. The same course will be run, with the exception only that the enemies of free inquiry and honest statement are not so numerous nor so powerful as in the seventeenth century, so that the effect will be less, both in extent and duration. So very slight have been the scientific attainments of the opposing party on this occasion, that it becomes those who are interested in the history of the sciences to take some measures for the preservation of their writings, since it is found that the purely theological works against the motion of the earth are extremely scarce, while only those which unite science, such as it was, with theology, are now* in any degree diffused.

If we throw away all the arguments which would now be considered fantastical, we shall find the sense of both sides of the controversy contained within very narrow limits. The strength of the Copernicans lay in the simplicity with which they exhibited the celestial motions; that of their opponents, in the then unanswerable argument of the throwing up of a stone. Both parties believed that the stone of itself would not follow the motion of the earth; at least such was the opinion until the Galilean philosophy was fully received. Fromond shows his penetration when he says that the Copernican philosophy will finally be wrecked on this argument; had he admitted an alternative, and assumed either that the mechanical argument would destroy the motion of the earth, or the motion of the earth would lead to an entire change in the principles of mechanical philosophy, no one would now have disagreed with him.

We shall close this article with a mention of the actual proofs of the motion of the earth.

1. It is difficult to believe, in the present state of mechanical knowledge, that any heavenly body is at rest, and the burden of proof must lie upon those who assert rest, and not upon those who believe in motion, which a person instructed in mechanics must do, until the contrary is proved.

2. If a motion existed, a centrifugal force would arise, which would produce an effect on the oscillation of a pendulum tried in different parts of the earth. [CENTRIFUGAL FORCE; PENDULUM.] Such an effect is found to be produced corresponding to that which should be produced by the earth's rotation; nor have those who deny that rotation ever produced any explanation of the phenomenon.

3. An experiment has been tried, which it will be worth while to describe, and which Delambre says had 'a sort of success.' When we say that a stone let fall from the top of a high tower should fall precisely under the point from which it started, we say that which ought not to be perfectly true; the reason is as follows:—The starting-point of the stone, being at a greater distance from the centre than the point directly under on the earth, describes a somewhat larger circle, and moves a little quicker. The stone therefore at the commencement of its fall has a motion from west to east, a little more rapid than the under point of the earth. The resistance of the air, though it exists with respect to the fall of the stone, does not exist with respect to the motion from west to east, since the air, earth, and stone are carried together: consequently the stone should fall a little east of the foot of the tower. This experiment was tried at Bologna by Guglielmini, who published his results in a work called 'De Motu Terræ diurno,' Bologna, 1792; it was repeated at Hamburg: the heights were respectively 241 and 235 feet (French).

In every instance the projected body fell a fraction of an inch to the east, and never to the west of the point directly under the point of projection. Had this departure been an accidental effect, it is incredible that it should always have taken place in one direction. Delambre does not state the number of experiments made; but if it were only six, and if the chances of departure east or west had been equal, it would have been 63 to 1 against the departure being always in one direction. In the last two proofs we are made to perceive the earth's rotation, by phenomena which can be explained on no other hypothesis that is worth consideration.

4. We perceive the earth's *orbital* motion only in the phenomenon of ABERRATION, from which one of two things must be true; either the earth moves round the sun, or light does not move in a straight line; and what is more, the light from every star, in whatever part of the heavens it may be found, changes its course with the position of the sun. The change, it is true, is minute, but it is as well established as it would be if it were visible to the naked eye; and it must be remembered that twenty seconds is not a small quantity when the eye is applied to an instrument capable of measuring one second. Were there no other phenomenon by which to test it, the orbital motion would be conclusively proved by that in question.

5. The next argument is analogy, which, though not perfectly conclusive itself, lends a great additional force to the rest. The planets all exhibit motion round the sun; this can be proved; and the only question that remains is, whether the sun moves round the earth, carrying the planets round itself, or whether the earth is itself a planet moving round the sun. The planets also, in most cases, revolve round axes visibly, and there is no proof that any one does not.

6. The last argument is authority, properly used. There are many who do not know enough of the subject to decide even between Newton and the worthy Frenchman, whose name it is unnecessary to mention, who thinks he proves the planets to be reflections of the sun upon the polar ice, and the southern hemisphere of stars to be a reflection of the northern upon a very curious crystal plane, but how placed we do not exactly know. With such persons authority must decide, if there be any decision at all in their minds; and it is of some importance to them to know what sort of authority they trust to. The argument from authority may be thus summed up:—1. The motions of the heavenly bodies are irregular, particularly those of the moon, which, when closely examined, exhibit irregularities, the cycles of which never were determined from observation alone. 2. At the time when the controversy about the earth's motion took place, the time of the moon's transit over the meridian, for instance, could not be predicted within several minutes. 3. By means of the labours of Newton and his successors in theory, and Flamsteed and his successors in observation, the prediction now rarely differs from the result by more than half a second of time. 4. It has been the unanimous opinion of those concerned in bringing astronomy to this state, not merely that the earth has a motion both of rotation and orbital progression, but that the proofs are such as to leave no doubt whatsoever on the subject; nor is it in history that any person who was mathematician enough to read the writings of Newton ever entertained any hesitation upon the subject.

MOTIONS OF PLANTS are phenomena connected with specific vital forces, and not capable of explanation upon any known principle. As they are very common, but, excepting in a few cases, usually overlooked, it is necessary to notice their existence. Locomotion, that is, the power of transporting themselves wholly from one place to another, is a property assigned to animals as one of the most obvious characters of the kingdom to which they belong, and is stated not to occur among plants; nevertheless locomotion in its exact sense does occur among some of the lower plants. Amongst Confervæ is a genus named Oscillatoria, consisting of green articulated filaments, deriving their name from the oscillating motion observable in them; these plants not only move their limbs, but shift their station with some rapidity; for example, if a patch of them is placed in water in a plate, and a black bell-glass is inverted over them in such a manner that its edges do not quite touch the plate, the Oscillatorias will remove from where they were first placed, and glide out on the side of the bell-glass which is exposed to light. The late Captain Carmichael observed their motions with great care, and sufficiently proved that they were not owing to external causes of any kind; especially not to agitation of the water in which the Oscillatorias are placed. Let, he says, a small portion of the stratum be placed in a watch-glass nearly filled with water, and covered with a circular film of talc, so that its edge may touch the

* There are, it is well known, different degrees of scarceness in old works. We have met with Riccioli, Fromond, Morin, Flenus, Rosse, Wilkins, Gilbert, &c., exposed for sale in London, within these five years, and with several more than once; but we never met with any of the purely theological authors quoted by Riccioli.

glass; the water will be rendered as fixed as if it was a piece of ice. The glass may now be placed under the microscope, and the oscillation of the filaments viewed without risk of disturbance from the agitation of the water. By following this course, it will be speedily perceived that the motion in question is entirely independent of that cause. The action of light, as a cause of motion, cannot be directly disproved, because we cannot view our specimens in the dark; but indirectly there is nothing easier. If a watch-glass, charged as above, be laid aside for a night, it will be found that, by the next morning, not only a considerable radiation has taken place, but that multitudes of the filaments have entirely escaped from the stratum, both indicating motion independent of light. Rapidity of growth will show itself in a prolongation of the filaments, but will not account for this oscillation to the right and left; and still less for their travelling, in the course of a few hours, to the distance of ten times their own length from the stratum. This last is a kind of motion almost unexampled in the vegetable kingdom.

Another kind of locomotion has been seen in the reproductive particles or spores of certain Confervæ. At a particular period of their life, these spores move about spontaneously inside the tubes in which they are generated, and at length force themselves out into the water wherein the mother-plant is floating. Once plunged in this element, the spores move about with velocity, in a gyratory manner, till they reach a shaded place, when they fix themselves by one end, produce a root, and lose all power of after-motion, so that such plants have locomotion when young, and are destitute of it when old. Many such phenomena are known to occur in plants of the same low kind of organization.

But while locomotion thus unquestionably occurs among some kinds of plants, vegetable movements are more commonly confined to the limbs, in which they are visible in different ways. A kind of motion occurs in roots, although not perceptibly, except by its effects. Many kinds of Orchidaceous plants appear one season in a spot at some distance from that which they occupied in the previous season, and thus appear to travel; in such cases however the shifting of place is effected by means of underground suckers, annually formed by the parent, which projects them to a certain distance from herself, and then perishes. The cormi, or bulbs, as they are called, of many Iridaceous plants exhibit the same kind of property, raising themselves upwards year after year, so that if originally buried some inches under ground, they at last travel upwards into the air; this is effected by each cormus forming a bud at its apex, which bud grows into a new cormus and kills its parent, forming a new cormus at its own apex, and then perishing in its turn. This power of rising upwards is possessed in a most singular manner by palms, but in those plants takes place in a different way; some palm-trees, which originally had their stem resting by its base on the surface of the ground, force it upwards by protruding the bases of their roots, till at last a kind of plinth is formed of many irregular arches, upon which the column or trunk of the palm-tree is upheaved. A case of this kind is mentioned by M. Poiteau, in the 'Annals of the Horticultural Society of Paris,' vol. iv., p. 4, f. 16, where the arches of the roots were high enough to allow a man to pass beneath them. Here it is evident that the elevation of the trunk is caused by some special power of extension in the roots, which exercise that power in the direction of least resistance, namely, of the air, rather than of the solid earth.

The phenomena of flowers' unfolding or closing under sunshine, of which everybody is aware, are strictly referrible to the class of vegetable motions, although as these occurrences may be owing to some irritation exercised upon the tissue by light, they ought perhaps to be considered of a class essentially distinct from the preceding, where motion takes place by an inherent power of the species, independent of external stimulants. With the unfolding and closing of flowers must also be arranged those singular motions in the parts of fructification which occur upon their being touched: if the filaments of the barberry are irritated, they rise up and strike the anthers against the stigma; if the sexual column of stylidium, which is bent over one side of the flower, is touched, it swings over instantly to the other side. Several cases of this power of motion occur in Orchidaceæ: if the caudicula of the pollen masses of Catasetum is disturbed, it springs up so violently as to separate itself from the column on which it grows, and to dart to a considerable distance. A very singular instance of motion in the flowers of another plant of this kind, growing in the Swan River Colony, has been described by Mr. Drummond (*Gardeners' Gazette*, vol. xiv., p. 428). The lower lip, he says, in which the anthers are placed is a boat-shaped box; the upper lip, which he supposes to be the stigma, forms a lid which exactly fits it; the hinge on which the lid moves springs from the upper part of the flower, and is attached to its centre; and when it opens, the upper part turns round within the box, comes out at the bottom, turns up and back; so that when fully expanded it stands fairly over the flower. The moment a small insect touches the point of the lid, it make a sudden revolution, brings in the point of the lid at the bottom of the box, so that it has to pass the anthers in its way, and makes prisoner any small insect which the box will hold. When it catches an insect, it remains shut while the insect moves about; but if the insect be not caught, the box soon opens again. The plant here imperfectly described is perhaps a species of Caleana.

Another kind of motion, more resembling spontaneous action, especially as it is not apparently connected with the application of stimuli, is that which occurs in the sexual apparatus of many plants at the period of impregnation. In Armeria at this time a short column below the stigmata lengthens, so as to close up the foramen of the ovule, and at the same moment the cord on which the ovule is suspended slips aside and elevates the ovule, so as to enable it to present its foramen to the column; the same phenomena are visible in Daphne Laureola and other plants; and something of an analogous nature occurs in Zygnemata, which at the period of fructification bring themselves together and effect a kind of spontaneous vegetable copulation. The most striking phenomena of this nature occur however in Asclepiadaceæ, which have their pollen grains closely packed in bags, from which it would seem that there is no escape: at the period of impregnation, each of these pollen grains projects one tube from its side, and these tubes all direct themselves spontaneously towards a thin space on the side of the bag that holds them. Piercing this bag, they succeed in extricating themselves and reaching the vicinity of the stigma, but are still at some distance from it; they then direct themselves towards that organ, and succeed in reaching it, wherever it may be, either by directing themselves at right angles, or downwards, or even upwards, as the peculiar structure and location of the stigma may require.

In the Sensitive plants, various species of Mimosa, especially M. pudica, the leaves fold up on being touched, and this so slowly, that it is easy to perceive that the folding is effected by the gradual communication from leaflet to leaflet of the shock produced by the touch: if a portion of the end of one of the leaflets of the Mimosa is cut off, the whole of the leaflets of that pinna gradually fold up, one after the other, from the point to the base; then the neighbouring pinnæ will fold up their leaflets from the base to the point, and presently the petiole itself will suddenly bow itself down; whereupon the folding up of the remainder of the pinnæ will take place: sometimes, after a little space, the leaves above and below will also close up, all under the influence of the one original injury. These curious phenomena have been watched with care by Dutrochet, in whose little book, 'Sur la Motilité des Plantes,' a long and particular account of the phenomena will be found. Many other plants possess this kind of sensitive power in their leaves: Smithia sensitiva, Æschynomene sensitiva, Porlieria hygrometrica, Biophytum sensitivum, are well-known cases; and it is recorded that in Senegal there grows a plant which the natives call by a name equivalent to 'How d'ye do?' as if it offered a friendly salutation by its bowing to those who touch it. (See De Candolle's *Physiologie Végétale*, p. 857, where several of the modes are enumerated in which leaves having motion close up.) The 'sleep of the leaf,' that is, their folding up and drooping at night, while they raise themselves and unfold by day, are powers of motion in the limbs of plants, which are doubtless of the same nature as that of the Sensitive plant and its allies. To the same class also must be assigned the fly-catching leaves of Dionæa: this plant, which grows wild in the marshes of Carolina, has a leaf which is bordered with a row of strong teeth, and when spread open, is strikingly similar to one of the toothed iron traps when set as used for catching game, that is, it consists of two roundish

sides, each furnished with a row of strong teeth. Near the middle of each side there grow three stiff bristles, placed in the form of a triangle; if one of these bristles is touched by an insect or any other means, the two sides of the leaf spring up instantly, the teeth cross each other, and the insect is held so fast, that it can only be extricated by forcing the sides of the leaf asunder, an operation of some difficulty, so great is the muscular force with which the contraction is effected. These movements are all owing to a specific irritability resident in the moving organ, and must be distinguished from the following, which takes place, to all appearance, spontaneously.

Desmodium gyrans, the Gora-chand of Bengal, was first mentioned in systematical botany by the younger Linnæus, who speaks of it as a wonderful plant, on account of its singular motion. 'No sooner,' he says, 'had the plants he raised from seed acquired their ternate leaves, than they began to be in motion in every direction; this movement did not cease during the whole course of their vegetation, nor were they observant of any time, order, or direction: one leaflet frequently revolved, while the other on the same petiole was quiescent; sometimes a few leaflets only were in motion, then almost all of them would be in movement at once; the whole plant was very seldom agitated, and that only during the first year. It continued to move in the stove during the second year of its growth, and was not at rest even in the winter.' 'The irritability of this Desmodium,' Burnett adds, 'is never so great, even in our best houses, as *it is* said to be in its native climate, and its motions here are very seldom so lively as those described by Linnæus. Warmth appears essential, for its movements are always the most observable when the heat is greatest; that they are not attributable to the sun's rays, nor to any currents of air, is shown from the fact that the plant loves the shade, and that the motion is most evident when the stove is closed and the atmosphere quite still. These movements have more the semblance of spontaneity than any others that have been observed in the more perfect plants; for the leaflets, if held quiet between the fingers for a short time, and their movements thus prevented, are said immediately on their release to revolve with accelerated force, as if to make up for the time lost during the forcible interruption.' De Candolle describes the motion thus:—the leaves consist of three leaflets, two of which are lateral, very small, linear, and oblong, and an odd one, separated from the two others, much larger and oval-oblong: the two side leaflets are in almost continual motion, which takes place by little starts, like the small hand that marks the seconds in a watch. One of these rises so as to mount about 50° above the level of the petiole, and the other falls on the opposite side to about the same distance; when the latter rises, the other falls, and thus a constant oscillation is maintained. The central leaflet also moves, but much more slowly, sloping first to the right, then to the left, and so on.

What the cause of these singular motions may be has never been explained, and it seems useless to inquire: they appear to belong to the class of first causes, concerning which we can know nothing further than their effects. It is evident that they are quite distinct in their nature from such motions as that of a stem bending towards the light, in consequence of the process of its solidification taking place more on the side exposed to light than on the other side.

If no mention is here made of the motions of internal microscopical particles upon their own axis, when floating in water, such as were remarked by Brown and others in pollen, and as may be found very commonly upon bruising plants in water, it is because such particles appear in all cases to be starch, and their motion, however singular, to be a physical rather than a vital phenomenon.

On Motion of Sap see SAP.

MOTRIL. [GRANADA.]

MOTTE, ANTOINE HOUDAR DE LA, was born at Paris, 17th January, 1672. His father was originally a hatter at Troyes, where he possessed a small estate called La Motte, whence the surname of the family was derived. After completing his studies at the Jesuits' College, he turned his attention to the law, which he shortly after gave up to follow his taste for the drama, and to assist at a private theatre in the representation of Molière's comedies. In 1693, being then only twenty-one years of age, he produced at the Théâtre Italien his first piece, entitled 'Les Originaux,' with little success. This piece has not been inserted among his works, but is printed in the 4th volume of Gherardi's 'Théâtre Italien.' Disappointed at his failure, he resolved to renounce the world, and retired with one of his friends to La Trappe, but the Abbé de Rancé, setting little value on the momentary enthusiasm of two inconsiderate young men, dismissed them at the end of two months, without giving them the habit of the order.

After returning to Paris he produced his opera 'L'Europe Galante,' which was very successful; in 1707 a volume of Odes, which, although much read, added nothing to his reputation; and in 1710 his 'Academical Discourse,' a model of the kind.*

The most presumptuous and extravagant act of La Motte was his translating the Iliad, without knowing a single word of Greek, and abridging that poem with the intention of improving it. This translation was preceded by a discourse, in which he endeavoured to prove that admiration for the antients, and particularly Homer, was a modern prejudice. Madame Dacier refuted this discourse by a tract entitled 'Des Causes de la Corruption du Goût,' to which La Motte replied by his 'Réflexions sur la Critique.' At the age of 40 he became blind, and also lost the use of his limbs, in which condition he remained for many years, and died 26th December, 1731.

His works, including his letters to the duchess du Maine, were collected in 1754, and filled 10 vols. 12mo. (*Biog. Univ.*; Voltaire.)

MOTTEUX, PETER ANTHONY, was born at Rohan in Normandy, in 1660, at which place he also received his education. After the revocation of the Edict of Nantes he came over to England, and succeeded in establishing himself in business, and kept a large East India warehouse in Leadenhall-street. Being master of several languages, he obtained a situation in the foreign-letter department of the Post-office. His death, which was attended with suspicious circumstances, took place on the 19th February, 1718, in a disorderly house in the parish of St. Clement Danes, and being the anniversary of his birth, completed his 58th year. His remains were interred in the church of St. Mary Axe, London.

This gentleman so completely acquired the English language as to be able to produce a translation of 'Don Quixote,'† and subsequently to write several songs, prologues, and epilogues, one of the latter of which will be found at the end of Sir John Vanbrugh's comedy of 'The Mistake.' He also wrote several plays, namely: 'The Loves of Mars and Venus,' Lond., 1697, 4to.; 'Beauty in Distress,' a tragedy, Lond., 1698, 4to.; 'The Temple of Love,' 1706, 4to.; 'The Amorous Miser,' a comedy in 3 acts, 1705, 4to.; also a poem on Tea, 1722, 8vo., with several French works translated from the English.

MOTTO, an Italian term, shortened by some of our old writers to *mot*. It means a word or sentence added to a device; and is commonly used, when put upon a scroll, as an external ornament of coat-armour. The use of mottoes for this purpose is antient, and as appended to a coat of arms they are frequently hereditary in families. In strictness, the motto should bear allusion to something in the achievement, but in modern times the taking of it rests entirely with the fancy of the bearer, and it may be changed at pleasure. A sentence or quotation prefixed to anything written is also termed a motto.

MOULDINESS is a name applied to all minute fungi which appear in masses upon organic bodies. It appears to be caused by a damp atmosphere and a diminution of light, both which conditions are favourable to the development of those bodies whose spores or reproductive particles are floating everywhere in the atmosphere, ready to spring rapidly into growth whenever they chance to fall upon suitable situations.

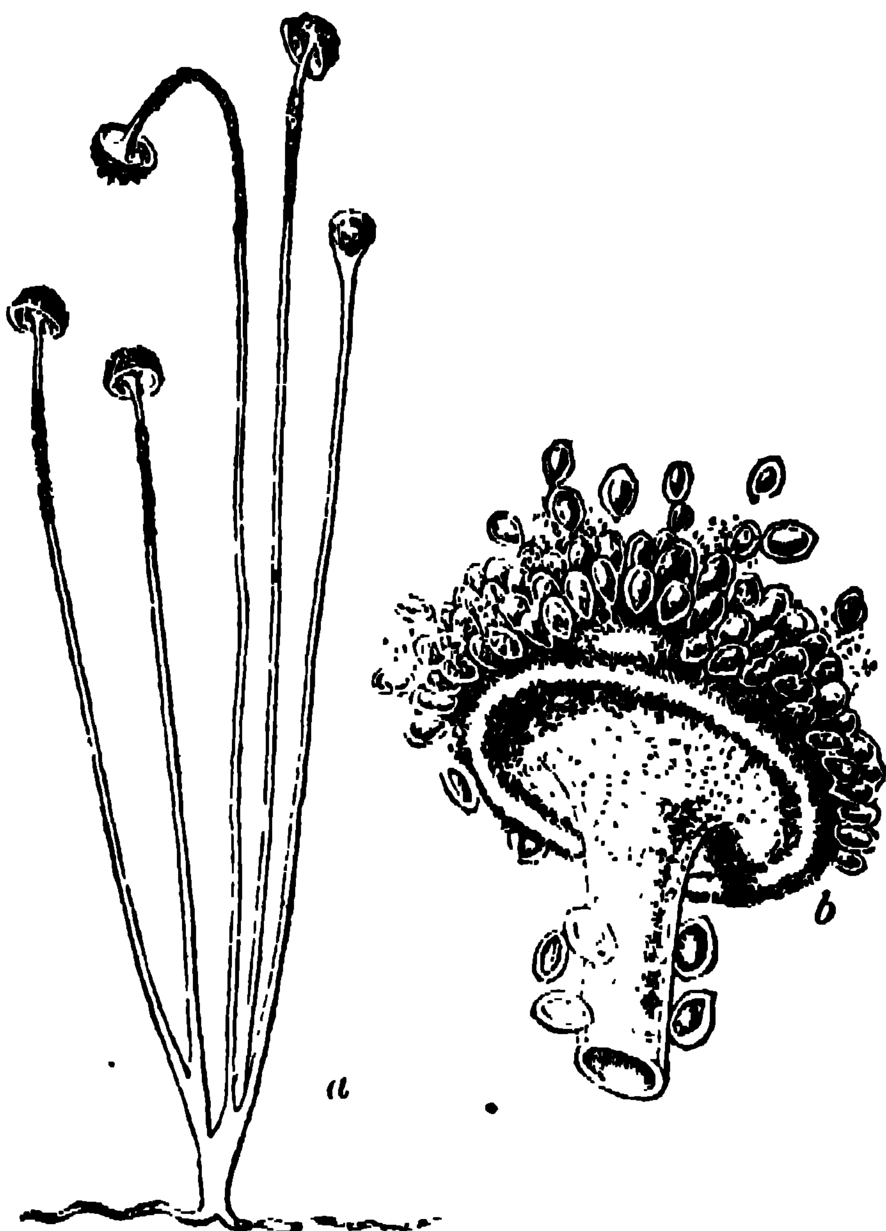
All the fungi that constitute mouldiness are so small as to escape observation, except when from their numbers they form microscopical forests, and then they clothe the surface of the body which they attack with light patches of yellow, blue, white, green, red, and various other colours. The species of these plants are extremely numerous, and are distributed

* La Motte's tragedy, called 'Ines de Castro,' is mentioned by Voltaire ('Siècle de Louis XIV.') as one of the most interesting of those which had kept their place on the stage.

† It appears however, by the title-page of an edition of 'Don Quixote, London, 1706, 4 vols. 8vo., that Motteux was only the publisher, and that the work was translated by several hands, and printed for Samuel Buckley, at the Dolphin, Little Britain.

by writers on fungi into many genera, chiefly belonging to the Hyphomycetous division of the order, the combining character of which is, that the plants are flocculent, naked (that is, not enclosed in a case, or seated upon a peculiar receptacle), distinct, but interwoven into a general mass, which looks like a thin web, or a collection of cobwebs.

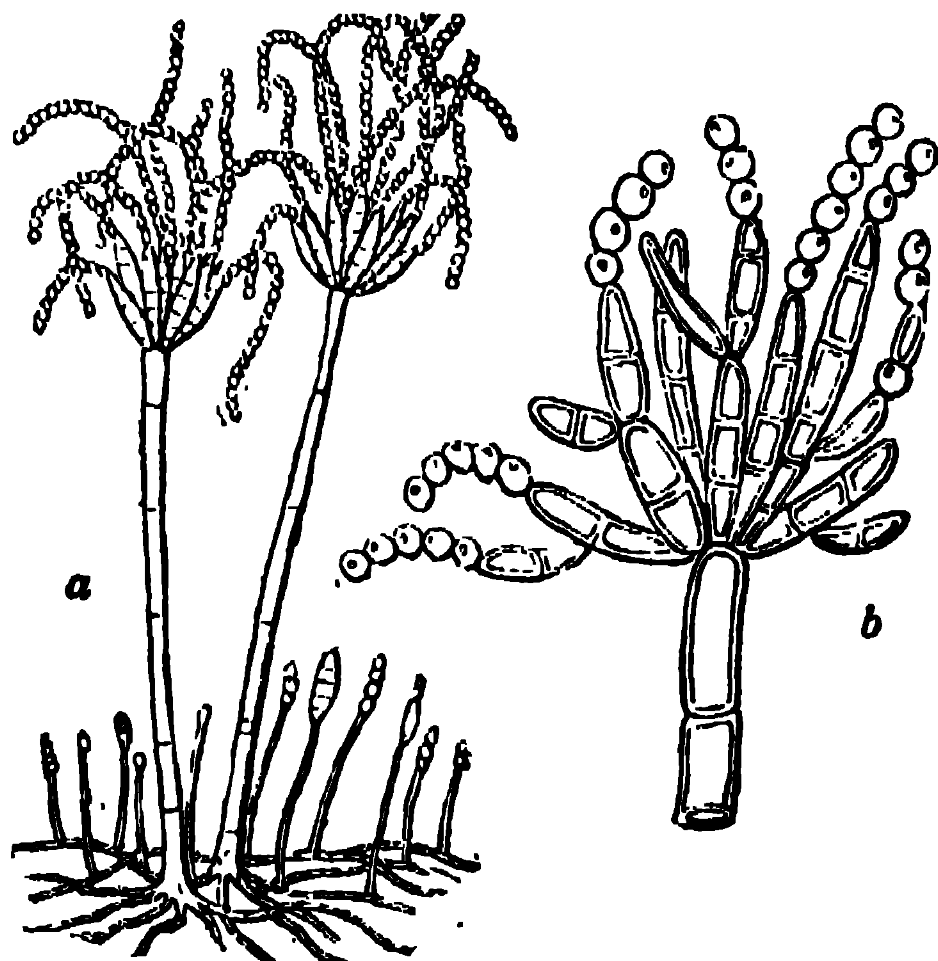
One of the most common is the Ascophora Mucedo, which forms a blue mould upon bread, paste, and similar substances prepared from flour. This plant forms a fine horizontal cobweb-like bed, from which rise up slender branches terminated by an expansion which bears the spores.



Ascophora Mucedo, very highly magnified.

a is a sporiferous branch arising from the horizontal bed; *b* is the termination of a branch covered with spores.

Another form is that of Penicillium, in which we have the same entangled flocculent bed, and a similar elevation of perpendicular branches: but the latter are not terminated by a disk covered with spores; on the contrary, they end in a jointed tuft, every division of which produces at its point a necklace of spherical sporules.

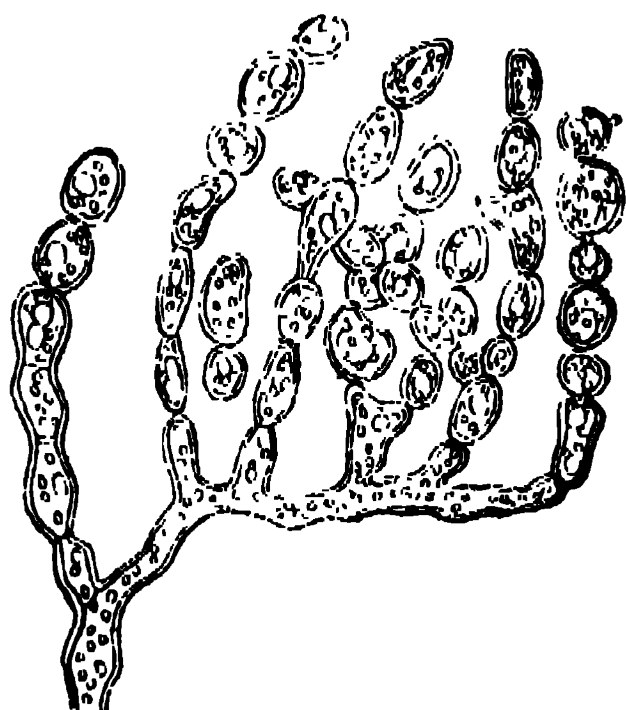


Penicillium verticillatum, highly magnified.

a represents a cluster of perpendicular branches springing up from the horizontal bed; *b* is one of the pencil-like heads which terminate the branches.

Mouldiness is occasionally produced by Coniomycetous fungi—that is, by those very imperfectly organised species which have no flocculent bed, nor any special part on which the spores are generated, but which merely consist of a series of joints within which reproductive bodies are formed. Of these, the Torula Casei, found in the crevices of putrid cheese, may serve as an example.

Many of these plants are capable of living under circumstances that would be fatal to any other form of vegetation; for example, Ascophora Mucedo springs up plentifully in paste poisoned with corrosive sublimate.



A morsel of Torula Casei, very highly magnified, after Corda.

Their general station is upon decaying animal or vegetable matter; but one species, the Botrytis Bassiana, attacks the *living* silkworm and kills it; others destroy house-flies, which may be seen in the autumn glued by these parasites to the window, on which they have alighted in a semitorpid state.

The following are the botanical names of some of the more common species of fungi that cause mouldiness:—

Hydrophora stercorea (yellow, turning black), on the dung of various animals; *Mucor mucedo* (bluish black), on fruit, pastry, &c.; *Eurotium herbariorum* (white, yellow, or orange), on damp plants in Herbaria; *Cladosporium herbarum* (green, turning black), on various decaying bodies, damp paint, &c.; *Aspergillus candidus* (white), very common; *Aspergillus glaucus* (blue), very common.

MOULDINGS (in Architecture), any assemblage of narrow surfaces projecting from the face of a wall or other surface and also advancing one beyond the other. They are bounded by straight lines, either horizontal or vertical, according to their situation, but the surfaces themselves are *plane* or *curved*, and if the latter, concave or convex, or else compounded of both forms; and again are either *plain* or *curved*. Sometimes indeed, instead of projecting, mouldings are *sunk*, as is the case when they form a border within a sunk pannel, for though they project with respect to the surface of the latter, they recede within the general face of the wall. The mouldings within the pannels of doors are of this description. Mouldings are employed as borders to doors, windows, and other apertures, as arches, in which latter case they are termed *archivolt mouldings;* while those forming the imposts from which the arch springs are called *impost mouldings*. The bases of columns likewise consist of mouldings. They are also employed to mark the horizontal divisions of a wall, both internally and externally, and every member to which they are applied is said to be *moulded*. As their edges are straight lines, their contour can be shown in drawings only by their shadowing, and by the outline which they produce at their extremities, as in the case of a cornice. But as this is insufficient, except to afford a general idea, in working drawings and those of detail mouldings are shown on a larger scale, and by means of a section through them, by which their *profile* is accurately defined; and upon a good profile, that is, one where the mouldings are well proportioned to each other, and so combined as mutually to relieve each other, and to produce both an agreeable variety of surfaces and of light and shade, much of the beauty and finish of a building depends.

Mouldings are distinguished by different names, according to their *profiles*, their sizes, or their situations. Thus the *fillet*, *tænia*, *band*, are all plane or flat mouldings, the only difference being that the first-mentioned is narrower than the others, and frequently is not so properly a distinct moulding as a space left between other surfaces, or else a rim to a larger moulding, as to a cymatium terminating a cornice, &c., while *tænia* is the name given to the broad fillet separating the architrave from the frieze in the Grecian Doric entablature, and *band* is applied to any still broader plane surface—thus if instead of dentils, in an Ionic or Corinthian cornice, a projecting plane surface be left where they would occur, it is called an *uncut dentil band*. The *corona* (one of the principal members in every cornice) is also a mere plain band, except that it is occasionally enriched

in Roman architecture. Again lesser convex mouldings are termed *beads*, but the longer mouldings of the same kind in the bases of columns are termed *tori* or torusses. The *cyma recta*, or *cymatium*, is a compound moulding, concave above and convex below; while the *cyma reversa*, or, as it is technically termed by workmen, the ogive or ogee moulding, is convex below and concave above. The *cavetto* is a mere hollow or sweep intervening between and serving to connect two mouldings, one of which projects beyond the other. The *scotia*, or hollow between the upper and lower torus of the base of a column, is a moulding of this kind upon a large scale, and has therefore a distinct name assigned to it, which also points out its situation. The *ovolo* is a simple convex moulding, so called because it is generally carved into *ova*, or ornaments in the shape of eggs, within hollows. The ovolo of the Doric capital (which is always uncut) is distinguished by the name of *echinus*. All the other mouldings may be carved or enriched, except the *cavetto* and fillet; the pattern being accommodated to the surface of the moulding. The cyma recta, or *talon*, as it is sometimes called, is cut with a peculiar kind of tongued or arrow-headed ornament.

These mouldings are common to both Grecian and Roman architecture, but besides being more profusely applied in the latter style, they have this marked difference, that in Roman architecture the curved mouldings, whether simple or compound, are described by quarter circles, whereas in Greek they describe other curves obtained from conic sections, and are therefore not only more elegant in their contour, but susceptible of far greater variety. Some of them are also occasionally *undercut*, that is, hollowed out below and behind, whereby, while a greater depth of shadow is obtained, a greater sharpness of lines and lightness of form are produced. Of this kind is what is now distinguished by the name of the *bird's-beak moulding*, because its section produces an outline very much resembling that of the hooked upper and lower mandible in the beaks of some birds. In Gothic mouldings, undercutting is very common, and hollows or recesses more or less deep are frequently numerous in the profiles of mouldings in that style. The mouldings are also for the most part produced by *splayed* or *bevelled* surfaces, that is, slanting or turned obliquely from the outer face or general plane where they occur. In that style the mouldings are so numerous, and the profiles produced by them so complex, as to render it impossible to describe or characterise them further. They are however of the utmost importance, and therefore require to be well studied and perfectly understood, for which purpose such works of detail as Pugin's 'Gothic Specimens' and 'Gothic Examples,' Moller's 'Denkmale,' &c., may be recommended. One circumstance however which ought to be mentioned is that the mouldings all recede within the face of the wall (like those of pannels), except labels, hood-mouldings, and others, that come under the general denomination of *weather mouldings*, because made to project instead of recede, and therefore more exposed to rain and weather.

In regard to Grecian mouldings, it remains to be observed that many of those which are uncarved, and therefore supposed to have been quite plain, were painted with some ornamental pattern, and that not unfrequently in the most brilliant colours. But this singular mode of decoration is treated more at length in the article POLYCHROMY.

MOULINS, a town in France, capital of the department of Allier; situated on the right or east bank of the river Allier, in 46° 34′ N. lat. and 3° 19′ E. long.; 161 miles from Paris in a direct line south-south-east, or 175 miles by the road through Fontainebleau, Montargis, and Nevers.

This town is scarcely noticed before the thirteenth century, when Robert, Count of Clermont, son of Louis IX. (St. Louis), king of France, and ancestor of the Bourbon family, founded here an hospital. It owes its name to the number of water-mills which were formerly here. It became capital of the Bourbonnois, and the residence of the dukes of Bourbon, one of whom, Louis II., built a castle at Moulins, which François I. of France finished, probably upon acquiring possession of the Bourbonnois, after the forfeiture of the Constable Bourbon, in the early part of the sixteenth century. Of this castle there is only a part remaining, namely, a square tower used as a prison, and some buildings occupied by the gendarmerie.

The town is agreeably and advantageously situated in a fertile plain, on one of the roads from Paris to Lyon, and on the bank of a navigable river. The immediate vicinity is very delightful; it is well wooded, and among the trees were formerly many mulberry-trees, planted for rearing silk-worms; these trees thrived exceedingly, until the decay of the silk manufacture, consequent on the Revolution, led to their being neglected or destroyed. The town is on a level site, and is tolerably well built.

The houses are chiefly of brick; the fronts are ornamented with figures formed in black bricks, the others being red There is a handsome stone bridge over the Allier, above 700 feet long and more than 42 broad, with foot pavements. It was built in the middle of the last century; immense cost and labour were bestowed in fixing the foundation, the depth of the water and the shifting banks rendering the bed of the river so insecure, that four bridges had been destroyed in the previous century. Beyond the bridge is a fine avenue of trees, extending about two miles in a straight line along the road to Limoges and Clermont. Moulins contains several pleasant promenades, and some handsome public fountains. Of the squares, that of Allier is the largest and most regular. There are a handsome town-hall with a colonnade, and a court-house lately built. In the church of the Visitation is the monument erected by the Princess des Ursins to the memory of her husband, the unfortunate Duke of Montmorenci, beheaded at Toulouse by order of Richelieu. There are fine barracks near the bridge, public baths, two large hospitals, and a small theatre.

The population of Moulins, in 1831, was 14,672 for the commune; in 1836 it was 15,231. The chief manufacture of the place is cutlery, especially excellent scissars. These articles are hawked about by women, who beset with the greatest importunity the traveller arriving in the town. There are several establishments for spinning cotton and woollen yarn, and for throwing silk. There are manufactories of blankets, cotton counterpanes, woollen stuffs, and hats. There are tan-yards and steam-mills for corn. Trade is carried on in corn, wine, iron, timber for ship-building, coal, cattle, and raw silk. There are ten yearly fairs. The townsmen are distinguished by their kindness of manner. There are coal-mines and quarries of limestone in the neighbourhood. Marble of different colours is found, but is not worked. Moulins has several judicial and fiscal government offices; a society of rural economy, physical sciences, and arts; a public library of 18,000 or 20,000 volumes; a high school, with museums of natural history and physics attached to it; a drawing school, and a collection of paintings and engravings.

Marshal Villars, one of the most eminent generals of the age of Louis XIV., was a native of Moulins. Moulins is the seat of a bishopric, of which the department of Allier constitutes the diocese. The bishop is a suffragan of the archbishop of Sens and Auxerre.

The arrondissement of Moulins has an area of 1002 square miles, and comprehends 85 communes. It is divided into nine cantons or districts, each under a justice of the peace. The population, in 1831, was 86,837; in 1836, 90,582.

MOULTAN. [HINDUSTAN.]

MOULTING. [BIRDS, p. 426.]

MOUNT VERNON. [VIRGINIA.]

MOUNTAIN LIMESTONE. Mr. Smith employed this term to designate the calcareous rocks which underlie the coal strata in England. It is the equivalent of the 'carboniferous limestone' of Conybeare and many other English geologists. Some German writers have translated the term into berg-kalk, while in France the corresponding version of Mr. Conybeare's title, 'calcaire carbonifère,' appears to be preferred. [COAL FIELDS.]

MOUNTAINS. Though the term mountain be universally understood, yet it will be found very difficult to define strictly what is meant by it. From the mole-hill in the meadow, to the gigantic Chimboraço, the gradations are infinite, and no positive line can be drawn between the hill and the mountain. Moreover, the name is sometimes given to a single elevation or peak, as Mount Ætna, &c., and sometimes to a whole and extensive cluster of eminences, as Mount Caucasus. Isolated mountains are rare, and when they do exist are generally, though not always, volcanic.

The general disposition of mountains is in groups or chains. The word group explains itself, but what is understood by a chain may not be so clear. When hills or mountains are so arranged as to form a line or band whose length greatly exceeds its breadth, such a disposition, whether the line be straight or curved, is called a chain, and sometimes

a ridge; though the latter name is more exclusively applied to the lesser chains. We are not however to understand by a chain of mountains, a single unbroken longitudinal eminence, like that formed by the connected roofs of a row of houses. A chain of mountains, on the contrary, is very irregular and composed of many subordinate parts. In a complete chain there are three parallel or nearly parallel ridges; the centre one is usually the highest. These three ridges, though distinct, are seldom equidistant from each other, and they are frequently united. From the points of junction, and from different parts of the outer ridges, other chains strike off at various angles, and these in turn send off other ramifications, which go on dividing and diminishing in height till the last undulations are lost in the general surface of the plain. These different branches of a chain have received various and very arbitrary names. Some divide the whole system of a chain into the primary, principal, primordial, or great chain, and secondary and tertiary chains; but these names having now reference to the order of formation of rocks rather than to their disposition, though the latter circumstance is greatly dependent on the former, they are at present confined to geological considerations, and we therefore say such a chain or ridge is a branch of some other chain or ridge. Thus the Apennines are a branch of the Alps. Minor ramifications, when short, are called spurs. Wherever the main chain sends off other chains, the former is, at that particular spot, higher than elsewhere, so that between two consecutive elevations there is an apparent depression: hence the summit or ridge-line of the main chain is divided into heights, which are called peaks, domes, &c., according to their shape; and depressions, which receive the general name of passes, because they are the places where the passage over the chain from opposite valleys is most easily effected. These passages or passes are termed *cols* in the Alps, *ports* in the Pyrenees, and *pertuis* in the Jura. They are also called gorges or defiles, but incorrectly, for the gorge is properly the contracted part of a valley, and the defile a very narrow passage at the foot of the mountains or winding amongst them. The ridge-line of great chains is also irregular in breadth as well as height; it is sometimes very narrow and sometimes very broad, and in some places spreads out into what is termed table-land (Langfeld in Norway). Table-lands, or plateaus, are however not always of this terrace form; they are not unfrequently sunk, if we may so say, into the broad summit of the ridge, so as to be surrounded by lofty eminences and peaks. Table-land is also sometimes ascended by gentle acclivities, without any appearance of mountains.

The valleys which are situated between the parallel ridges of the main chain are termed longitudinal valleys; their axis, and consequently the principal watercourse, is nearly parallel to the direction of the chain. The valley of the Rhône above the lake of Geneva, the valley of the Magdalena in South America, &c., may be taken as examples. Two things have been remarked in longitudinal valleys: first, that there is sometimes so perfect a conformity between the re-entering angles on one side and the salient angles on the other, that if it were possible to bring the two sides into contact, they would perfectly correspond, so as to leave no trace of their having been separated; and, secondly, it has been observed, that the side of the valley opposite to the centre ridge is the steepest. These observations are true as regards many places, but are by no means to be received as universally correct. The other valleys, whose axes form various angles with the direction of the great chain, are the principal valleys of a country, and are usually designated by the names of the chief rivers which flow through them. The valleys of the tributary streams which empty themselves into the main rivers are called lateral valleys. The terms upper and lower valley are sometimes used to denote the parts of a valley as they lie along the higher or lower part of a river's course. Such then are the parts of a regular chain of mountains, but we are not to suppose that all those great elevations to which we give the name of chain are thus regularly formed. Mountains are sometimes grouped, as we have said, so as to present no appearance of a chain; sometimes the chains run parallel, but wholly independent of each other; in some cases they radiate from a common centre or nucleus. Indeed nothing can well be more irregular than the arrangement of mountains, and they differ as much in height, steepness, and particular appearance. By some (Bergmann) it has been imagined that in chains running north and south the western slope is the most abrupt, and that when the chain runs east and west the southern slope is the steepest. But this is far from being always the case, and General Andreossy has laid down as a principle that the steep side of a chain of mountains is that which looks towards the higher part of the general slope on which the chain is set. This opinion is doubtless better founded than that of Bergmann, nevertheless it is not strictly correct; and there seems reason to believe that no general law obtains on this subject.

The appearance presented by chains of mountains is not only very different in different parts, but the very same mountains when seen at a distance no way resemble their aspect when seen nearer. At a distance the minute irregularities are lost in the general contour, and the particular shadows are blended into a uniform tint. The forms of rocks generally depend on their nature, and a practised eye can sometimes pretty correctly divine the latter from the former. These may either present the aspect of needles or sharp pointed masses, or the summits may be dome-shaped, or stretch along like a vertical wall, either entire or bearing a resemblance to ruined battlements and towers; sometimes the whole mass is piled up into a succession of gigantic steps or terraces. Individual mountains and hills also vary in form; those which are volcanic are generally conical; others are round, oval, lumpy, saddle-backed, &c.

Mountain-chains are the natural water-sheds (the *divortia aquarum*), but it must not be thence inferred, as has too frequently been the case, that all water-sheds are mountain chains. This erroneous idea has covered our maps with mountains where in nature not a hill is to be seen.

Another error is to regard the mountains of the earth as so many connected chains, which, by starting from some particular point, may be traced stretching and branching continuously over the whole surface of the globe. The fallacy of such pretended continuity is evident from the difference in the arrangement as described by different writers. The truth is, that mountains are scattered over the surface of the land in the greatest confusion, here isolated, there in groups or in chains; the chains being in some places single and independent, in others connected; in one place running in parallel directions, in another intersecting, crossing, or branching off at different angles; in some cases completely enclosing a certain extent of country so as to form an entire and perfect basin, in others only partially enclosing a space. In one country the mountains are set in the centre, or near one of its coasts, and in the direction of the greatest length of the country; in another, they are set across the country. In fact, the chains are observed to be in all possible directions, both as regards the points of the compass and the trending of the coast-lines. Thus, with the exception of the Andes and the Rocky Mountains, the Appalachians, the Ghauts of India, the Scandinavian Alps, and the Apennines, there is very little conformity between the direction of mountain-chains and the configuration of countries.

Mountains have a very important part to perform in the general economy of the earth; they arrest the fleeting clouds, whose precipitated waters they store up in their interior and exhaustless reservoirs, whence springs are continually issuing, which unite and form those streams that fertilise the plains, or, collected into mighty rivers, favour the transport of commodities and facilitate the intercourse between the ocean and the interior of the continents. The influence of mountains on local climate is all-powerful, and depends upon the direction in which they lie as regards the sun's course, their height, their position on the surface of the globe, their proximity to or remoteness from the sea, the winds they arrest or give passage to, &c. Mountains have moreover a climate of their own, or rather a great variety of climates. Thus in ascending from the sea towards the summit of the Andes, every kind of climate is passed through as completely as if the traveller were to proceed from the equator towards the pole. At an elevation of about 16,000 feet on the Andes under the equator, we reach the limit of perpetual congelation; and mountains in that region which exceed that height have their summits covered with eternal snow. The line of perpetual congelation is however far from being parallel with the general surface of the earth. It approaches that surface as it advances towards the poles, but the laws which determine this line are still very imperfectly known. [CLIMATE.]

The limits of perpetual congelation, as ascertained from the stability of snow on the mountains, are subject to vary

with the particular aspect of the mountains and other local circumstances. Thus, generally speaking, the snow-line is highest on the south side of mountains in the northern hemisphere, and *vice versâ;* but this is not always the case; and according to M. Jaquemont, the line of perpetual snow is much higher on the northern than on the southern side of the Himalaya mountains. Mr. Pentland states that the limit of perpetual snow is at an elevation of 15,800 feet on the mountains of Vilcanota in South America, which are as far south as 14° 33′.

The fact of the cold increasing as we ascend mountains is due in part to the greater rarity of the atmosphere in the higher regions, and to their greater distance from the radiated heat of the plains; nevertheless the particular aspect of various parts of mountains as regards the sun, and the conformation of the higher valleys, greatly modify the cold of particular places; and a much greater heat is sometimes experienced in a high valley than is felt in one much lower down. To this circumstance is due in part the seeming anomalies that are met with in the habitation of plants, many being found at heights where they would be little expected.

Though mountains are such striking objects, and, when contemplated only with respect to their absolute elevation above the sea, appear to be enormous protuberances on the earth's surface, they are very inconsiderable when compared with the whole mass of the globe. The habitable parts of the earth, at least those where population is most dense, and in which human industry is most concentrated, all lie within a few hundred feet above the sea, which may be regarded as a part of the true surface of the sphere. But even the height of the loftiest mountains, which is about five miles, is only about one eight-hundredth part of the radius of the earth. In books of travels we often find the distance mentioned at which a particular mountain is visible. As assertions of this kind are sometimes loosely made, the following rule will serve for roughly estimating the distance at which a mountain of known height can be seen from the surface of the sphere: multiply the square root of the height of the mountain in feet by 1·2247; the product will be the distance in miles at which the mountain is visible.

With regard to the heights of mountains it may be observed that they vary considerably. Some authors however regard every eminence below one thousand feet as a hill. Since the application of the barometer to the admeasurement of heights, there are few mountains of any importance, in Europe at least, whose elevation above the sea is not now known and registered. A list of the principal mountain heights on the globe would fill a volume. It may be sufficient here to give the heights of the principal peaks of some of the more important chains.

Europe.—Mont Blanc, Alps, 15,668 feet; Mont Perdu, Pyrenees, 11,283; Monte Corno, Apennines, 9523; Lomnitz, Carpathians, 7962; Sneehetta, Dovrefield, Norway, 8122; Mulhacen, Sierra Nevada, Spain, 11,678; Mont Mezin, Cevennes, France, 6567; Puy de Sanci, Auvergne, France, 6200; Ætna, Sicily, 10,870; Olympus, Greece, 9754; Vesuvius, 3932.

Asia.—Dhawalagiri, 28,077; Jewahir, 25,747. These two are peaks of the Himalaya. Mowna Roa, Sandwich Islands, 15,988; Ophir, Sumatra, 13,840; Egmont, New Zealand, 11,430; Italitskoï, Altaian chain, 10,735; Ararat, Armenia, 17,260; Arjish, Anatolia, 10,000?; Olympus, Anatolia, 6500; Lebanon, Palestine, 9600; Awatska, a volcano in Kamtchatka, 12,000 feet.

Africa.—Geesh, in Abyssinia, 15,000?; Peak of Teyde, Teneriffe, a volcano, 12,180; highest peak of Atlas chain, 12,000, and perhaps more.

America.—Nevado di Sorato, 25,250; Illimani (the richest gold mountain of Peru), 24,450; Chimboraço, Andes, 21,600; Antisana, 19,136; Cotopaxi, 18,867; Pichinca, 15,931; Popocatepetl, Mexico, 17,720: the last four are volcanoes. Rocky Mountains, 11,000; Mount Washington, Appalachians, 6650.

For the details of particular chains and remarkable mountains and volcanoes see their several names.

MOUNT SORREL. [LEICESTERSHIRE.]

MOURZUCK. [FEZZAN.]

MOUSE. [MURIDÆ.]

MOVEMENT, in Music, a detached and independent portion of a composition. Symphonies, concertos, quartets, sonatas, vocal pieces of various kinds, &c., are divided into portions commonly differing from each other in time as well as in key, and every such portion is called a movement. Thus, the Pastoral Symphony of Beethoven consists of five movements, viz., 1, a Country Scene; 2, The Rivulet; 3, The Village Dance; 4, The Storm; 5, as a *finale*, The Shepherd's Song.

MOVING FORCE may be defined as force considered with reference to the momentum it produces, in like manner as accelerating force means force considered as the cause of acceleration. Imagine a bullet, with a feather tightly fastened to it, thrown from the hand into a vacuous space. The action of the earth will cause a parabola to be described [PROJECTILES]; and as the feather must move with the bullet, all the alterations of velocity (accelerations or retardations) which take place in the one also take place in the other. All forces then, so far as they are estimated by the accelerations they produce, are the same in both cases. But if we take into account the masses of the two substances, we see that very different degrees of pressure must be applied throughout the same time to produce the velocity at starting, and the action of the earth applies very different degrees of pressure to the two.

Moving force is applied to the cause of MOMENTUM, in the same sense as accelerating force to the cause of acceleration. Apply continued pressure to a weight of ten pounds, such as will in one second produce a velocity of 80 feet per second; apply another pressure to a weight of seven pounds, such as will also in one second produce a velocity of 50 feet per second: the momenta produced in one second are then as 10×80 to 7×50, or as 800 to 350; and the moving forces are said to be in this proportion. The following equation is made the measure:—

$$\text{Moving force} = \text{mass} \times \text{accelerating force};$$

but this is on the supposition that a unit of acceleration produced in a unit of mass shall require the amount of pressure which is taken as the unit of moving force. [MASS; MOMENTUM.]

The connection of momentum and acceleration are developed in VELOCITY and VIRTUAL VELOCITIES. It is necessary to remind the young student in mechanics that accelerating force is a mathematical abstraction, the conditions of all problems which actually occur introducing as data not accelerating forces, but moving forces. Owing however to the problems which usually come earliest in mechanical treatises containing only accelerating forces among their data, or given laws of acceleration without reference to the masses in which acceleration is produced, or the pressures which produce them, the learner is not sufficiently reminded of this.

MOWBRAY, SIR ROGER DE, of Barnbougle, son of Geoffrey de Moubray, lord justiciar of Lothian in the end of the thirteenth century. Sir Roger was lord justiciar of Scotland from 1319 to 1321; when, having engaged in a conspiracy against King Robert Bruce, he was seized and put in prison. He died here before trial; but, notwithstanding, process was led against him, and sentence pronounced on his dead body. (Fordun, xiii. 1.)

MOXA, a word of uncertain origin, signifying any substance whose gradual combustion on or near the skin is used for the relief or cure of disease. This method was early practised in the East, particularly by the Chinese and Japanese, from whom it was copied by the Portuguese; but having fallen into disuse, it was revived by the French surgeons during the Egyptian campaign. The substance employed by the Chinese is formed of the downy covering of the leaves of the Artemisia Moxa (De Candolle): but the down of many other plants, or the pith, may be used. The stalk containing the pith of the common sun-flower (Helianthus annuus) is a very convenient means, when the prepared moxas cannot be procured. Those used in Britain are all imported from France, and generally consist either of a pyramidal or cylindrical roll of linen, which is mostly steeped in a solution of nitrate or chlorate of potass. The size of this is generally about eight lines high, and from four to five broad. It is ignited at the one end, and the combustion gradually extends to the other. This differs from the actual cautery by means of a red-hot iron, in as much as the latter produces immediately its maximum of effect, which progressively diminishes, while in the case of the moxa the heat gradually increases, and the greatest effect is produced towards the end of the operation. It is also different from a blister, both in its mode of action and

in the stage of a disease in which it may be most advantageously applied. The general principles which should regulate the use of blisters having been already explained [BLISTER], as well as those connected with the actual cautery [ESCHAROTICS], the following observations refer to its distinctive characteristics. We may remark that the pain is not so great as might be expected, indeed less than often attends blisters, and that it is often borne by females and children, or at least boys, with the greatest fortitude.

Besides the secondary effects of the local application, which, being of a counter-irritative kind, are common to blisters and moxa, in the case of the latter there is the additional influence of a certain amount of caloric. 'Caloric, applied under certain circumstances and with appropriate restrictions, stimulates in a powerful manner the capillary vessels, causing them to contract their diameters, and to circulate their blood with greater velocity; and, either by this action on the capillaries, or by a direct one on the lymphatics of the part, it has also the power of exciting the function of the absorbents in a remarkable manner. The direct effects of moxa are seldom, if ever, confined to the skin; and if the moxa be applied, through the medium of a needle, the caloric may be made to propagate its influence to any depth. The beneficial influence of moxa, in relieving or curing disease, apparently depends on its tonic action over absorption and capillary circulation. Hence it should be employed in those cases only in which there exists a state of debility of the capillaries and a consequent retardation of their circulation, and a diminution of absorption; and invariably avoided wherever there is increased action or active inflammation.'

To hold the moxa over the part affected, an instrument has been invented, but a portion of silver-wire formed into a loop, surrounding the cylinder near the base, is sufficient. The moxa may be applied in various ways. 'It may be used so as not to cause any injury; in a greater degree, so as to produce vesication; and in a still greater degree, an eschar, which may be either deep or superficial; or it may be employed with the acupuncture needle.' In the first form, it is burnt near, but not in contact with, the part affected, and is often of great service in healing indolent ulcers; it generally requires to be applied once a day. It is even used in some chronic inflammations of the eye with very good effect. In the second form it is also to be held near the skin, and continued till a blister results. In tic douloureux of very superficial nerves this is sometimes beneficial. The third mode is the most common, and for this the part to which the moxa is intended to be applied is marked out, and the moxa being surrounded with a piece of card-paper, which has been moistened with a solution of common salt, to protect the adjacent skin, the moxa is ignited at the one end, and the combustion increased, if necessary, by means of a blow-pipe. For the cure of obstinate sciatica and deep-seated diseases of the joints a frequent repetition of the moxa may be required, but it seldom fails to give relief. 'When the moxa and acupuncture needle are used together, a moxa of a proper size is to be perforated by a needle of such a length as will be sufficient to reach the seat of the disease, and at the same time extend so far from the surface of the skin as to keep the moxa about one inch from it. The needle is then introduced, and the moxa is now put in a state of combustion, and the heat disengaged from it is communicated to the needle, and thence conveyed to the seat of the disease.' [ACUPUNCTURE.] When the pain from the third mode of applying the moxa is very great, a linseed-meal poultice will generally mitigate it.

Prejudice against this remedy, on account of its apparent severity, has prevented its being extensively used, but almost all practitioners who have made trial of it can attest its efficacy. It will rarely be had recourse to, except in cases of a neuralgic or paralytic kind of such obstinacy or painfulness as to justify the measure; but in such diseases it should not be overlooked. (Wallace, *On the Action of Moxa*.)

MOZAMBIQUE, the Town of, is the principal settlement of the Portuguese on the eastern coast of Africa. It is situated in 15° 2′ S. lat. and 40° 43′ E. long. The harbour is formed by a deep inlet of the sea, five miles and a half broad and six long, which receives the waters of three considerable rivers. At the entrance are three small islands, which, together with reefs and shoals, render the anchorage perfectly safe in the worst weather. Of these islands, that of Mozambique, on which the city stands, is formed of coral, is very low and narrow, and scarcely one mile and a half long. It is situated nearly in the centre of the entrance of the inlet. The other two islands, S. George to the northward and S. Iago to the southward, lie opposite to one another, nearly three miles outside that of Mozambique; they are of coral, covered with vegetation, but without inhabitants.

The north-eastern extremity of the island is occupied by the fort of S. Sebastiaõ, which was erected soon after the Portuguese took the place. Though much neglected, it is still a strong fortification and capable of making a formidable resistance. There are also two other small forts, one of which is built at the southern extremity of the island. The streets of the city are narrow, but the houses are generally lofty and well constructed. Nearly in the middle of the city is a large square, at the eastern extremity of which is a long and commodious stone wharf, built on arches, stretching out from the shore almost to low-water mark, and affording at all times an excellent landing for boats. On the three other sides of the square are the palace of the governor, the custom-house, and the main-guard. The palace is an extensive stone building, apparently of great age, with a flat leaden roof and a large square court in the centre. The city takes up one half of the island, and to the south of it is the Black Town, inhabited by coloured people, whose small bamboo-huts, placed in the most irregular order, form a striking contrast to the lofty stone buildings of the Portuguese and their regular streets. The country surrounding the bay is for the most part uncultivated, except along the northern shores opposite Mozambique, where extensive tracts of ground are under cultivation and supply food for the maintenance of the population. Rice and other provisions are also imported by the Arabs.

The population, amounting to about 6000, consists of a small number of Portuguese, and a larger number of Canareens, an appellation given to the Creole Portuguese of Goa and the other Portuguese settlements in the East Indies. There is also a considerable number of Banyans from Hindustan, but the free coloured people and the slaves constitute the bulk of the population. The commerce of Mozambique has greatly decreased, and in recent times it was chiefly supported by the exportation of slaves to Brazil. In addition to slaves, only a small quantity of ivory, gold dust, and a few articles of smaller value were sent abroad.

Mozambique was first visited by Vasco de Gama in 1498, who at first was received in a friendly manner, but became an object of hatred as soon as it was known that he was a Christian. It was only by force that he could obtain the requisite necessaries and a pilot. The town was taken in 1506 by Tristan da Cunha and Albuquerque, and as most of the commercial places of that coast experienced the same fate about that time, Mozambique became the centre of the Portuguese possessions in those seas, and the seat of a viceroy, to whom all other governors in Africa were subordinate. As long as the Portuguese remained in possession of their extensive conquests in India, Mozambique and the other settlements on the coast were in a flourishing state, but they began to decline in the seventeenth century, and have continued to decline ever since. The governor of Mozambique has still the supreme authority over all the Portuguese settlements from Cape Delgado on the north to Dalagoa Bay on the south. He remains only three years in office, and is then promoted to some other government.

(Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar;* and Prior's *Voyage along the Eastern Coast of Africa.*)

MOZAMBIQUE, THE COAST OF, is a term used to designate that portion of the eastern coast of Africa which is situated between Cape Delgado (10° 41′ S. lat. and 40° 34′ E. long.) on the north, and the northern mouth of the river Zambesi (17° 30′ S. lat. and 33° E. long.) on the south, constituting the western side of the wide strait by which the island of Madagascar is separated from the mainland of Africa, and which is called the Channel of Mozambique.

Though this country lies along a sea frequently navigated by vessels sailing to the East Indies, and though the Portuguese have had settlements on it for more than three centuries, the country is very little known as regards its principal features, with the exception of the coast-line, which was surveyed by British officers in 1823 and 1824. The Portuguese have several forts along this coast, but their

authority hardly anywhere extends more than ten miles inland, and in many places it is not even acknowledged on the shores. The interior is inhabited by a peaceful but powerful and brave nation, the Makawas, who maintain a commercial intercourse with the Portuguese, but do not permit them to visit their country.

The narrow beach is generally lined by a shore from twelve to fifteen feet high, covered with bushes, and composed of sand. This strip of elevated ground seems to be of moderate width, and behind it extends a plain dotted with clumps of trees on some elevated mounds. This plain is a morass of great extent and considerable depth, and is impassible, being covered with grass nearly six feet above the water. Between it and the sand-hills is a narrow strip of dry land covered with jungle, the haunt of elephants, hippopotami, deer, lions, and tigers. Along the course of the numerous rivers the country is higher and drier; it is also generally covered with forests, whilst along the seashore trees are scarce, and grow principally on the water's edge. It is not known how far the morass extends inland, but about thirty miles from the coast the banks of the rivers are high and the country cultivated, though still intersected with extensive swamps. The mountains and hills which constitute the eastern border of the table-land of southern Africa occur on the banks of the Zambesi river, about 180 miles from the sea, but that is the only place in which their situation is known. Vessels sailing along the coast perceive no mountains on the continent.

The sea along the shores of this country is considered very dangerous to navigators, and many vessels are lost. For a space of ten to twenty miles, it is lined by shoals, on which rise several small islands; some of them consist of dry sand, and are bare, whilst others are well wooded. Most of them are coral islands. The channel which divides these islands from the continent has generally deep water. The sea east of the shoals is nearly everywhere unfathomable. The most remarkable of these islands are Fuego or Fogo, Mafamede, and St. Antony, all of which are situated south of Mozambique: they are uninhabited. Towards Cape Delgado are the Querimba islands, which are of various sizes, but all low and formed of coral, with long flat reefs extending seaward, and rising abruptly from an immense depth. Between these islands there is good anchoring ground, vessels being sheltered by the mainland to the westward, and in every other direction by islands and reefs, so as to afford security to vessels in the heaviest gales. The best harbour is formed by the islands Ibo and Matamo. Ibo and Querimba are the only inhabited ilands.

Here, as in all tropical countries, the year is divided between the rainy and dry seasons. The rains commence in November and continue to the end of March. They are abundant, and the country along the rivers is then overflowed to a distance of several miles. The heat in summer being very great and the country not well drained, the numerous swamps render nearly the whole coast unhealthy, especially for Europeans, who are not inured to the climate.

The country is rich in productions. The grains which are cultivated are rice, millet, maize, and a small quantity of wheat; the most common vegetables are cabbage, lettuce, spinach, peas and beans of different kinds, tomatas, pumpkins, and cucumbers. The fruits are cocoa-nuts, mangoes, oranges, limes, acajoa-apples, custard-apples, pineapples, guavas, bananas, and plantains. Different kinds of pimento are also cultivated. Fish and turtle abound on all the coral-banks and islands. Cattle, sheep, and especially goats, are numerous. The exports are ivory, the tusks of the hippopotamus, gold-dust, columbo-root, gums, and some amber. Formerly a great number of slaves were exported.

The settlements which the Portuguese still maintain on the eastern coast of Africa do not extend to the north of Cape Delgado. The most northern is Ibo (12° 20′ S. lat. and 40° 30′ E. long.), the harbour of which is formed by the Querimba island. It is strongly fortified, but does not appear to be a place of trade. Farther south is Pomba, which has one of the finest harbours on the coast, the entrance being a channel between two rocky points, one mile and three-quarters across; but the basin into which it opens is nine miles long by six broad, and has sufficient water for the largest ships. This place has some trade. Near 15° S. lat. are three excellent and spacious harbours, Port Conducia, Port Mozambique, and Port Mokamba, but only the second is used for commercial purposes.

The most southern Portuguese settlement on this coast is Quilimane, built on the northern bank of the northern branch of the river Zambesi, which branch is likewise called Quilimane. It is about eight miles from the sea. The river at its entrance is a mile broad, and immediately increases in width considerably. The place contains only thirty-two houses, built of brick, which are inhabited by the Europeans and their descendants, and a great number of huts for the slaves. The population is about 2800. The trade in slaves was considerable till very recently. Besides rice, it exports ivory and some gold and silver.

(Owen's *Narrative of Voyages to Africa, Arabia, and Madagascar;* and Prior's *Voyage along the Eastern Coast of Africa.*)

MOZAMBIQUE, THE CHANNEL OF, divides the island of Madagascar from the continent of Africa, washing the western shores of the island and the coast of Mozambique. Opposite the town is the narrowest part of the channel, but even here its width is 250 miles. The length of the channel, between 12° and 25° 45′ S. lat., may be about a thousand miles. Towards its northern extremity are the Comoro Islands. [COMORO ISLANDS.] Along the coast of Mozambique are extensive shoals with several low coral islands, and along the Madagascar shore several rocky islands, but only a few small islands occur in the middle of the channel. The shores of Madagascar are tolerably high, but those of the coast of Mozambique are all low. The depth of water is very considerable, it being impossible in many places to get soundings close to the shore on the side of Madagascar, or close to the shoals on the opposite side.

This channel is much navigated by vessels bound to the East Indies; as it affords at certain seasons a more speedy passage than any other course; this however depends on the monsoons, or periodical winds, for the current always sets in the same direction, which is southward, and with considerable force. From April to November the south-east monsoon prevails, the winds blowing from south-west, west, south-east, and east-south-east along the whole extent of the channel. In the beginning of November the north-east monsoon is experienced at the northern extremity of the channel near the Comoro Islands, and in the course of that month it proceeds farther south, and about the end of it reaches St. Augustin's Bay. But it does not extend farther, the sea south of a line drawn from St. Augustin's Bay in Madagascar to the Bazaruta Islands near the coast of Sofala being all the year round under the dominion of the south-east monsoon, or rather trade-wind. According to the prevalence of these monsoons, vessels going to and coming from India frequently pass through this channel. It is also occasionally visited by whalers, as the black whale, which yields the spermaceti, is very abundant in these seas. Water-spouts are of frequent occurrence, as well as in some parts of the Indian Sea towards its eastern border.

(Owen's *Narrative of Voyages to explore the Shores of Africa, Arabia, and Madagascar;* Prior's *Voyage along the Eastern Coast of Africa.*)

MOZART, JOHANN-CHRYSOSTOMUS-WOLFGANG-GOTTLIEB, was born at Salzburg, January 17, 1756. His father, Leopold, the son of a bookbinder, was sub-director of the chapel of the prince-archbishop of Salzburg, and employed the hours not devoted to the duties of his office in teaching the rules of musical composition, and also in giving lessons on the violin. His *Violinschule*, a work in quarto, published at Augsburg, in 1769, was much esteemed in its day, and may still be profitably read by scientific students. He married Anna-Maria Pertl, and what has been pointedly noticed by M. Schlictegroll (whose *Necrology* has proved highly useful to us in the present instance), will not perhaps be thought altogether unworthy of remark by those who investigate moral and physical causes and effects, namely, that this couple, the parents of one so admirably organised for creating beautiful harmonies, were distinguished by personal beauty of the rarest kind. They had several children, all of whom died when but a few months old, except the subject of this notice and a sister four years his senior. The latter received instructions on the harpsichord from her father when her brother had scarcely completed his third year, and at that early period the child evinced in the most decided manner the pleasure afforded him by combined sounds, as well as his aptitude for music generally. His amusement was to seek out *thirds* on this instrument, and his success was followed by the strongest demonstrations of infantile joy.

When the young Mozart was four years old, his father, hardly in earnest, taught him a few easy minuets and simple lessons, each of which he learnt in about half an hour. In less than two years more appeared the first dawn of his talent for composition; he invented short pieces of music, which his father noted down; but it is to be regretted that not one of these curiosities was preserved. That great sensibility which almost invariably is a concomitant of genius, and which never forsook him, was apparent from the moment he could express himself. 'Do you love me?' was a question he frequently put to those about him; and when he was ironically answered in the negative, his tears began to flow. In all his pursuits his ardour was extraordinary. 'While learning the elements of arithmetic, the tables, the chairs, even the walls, bore in chalk the marks of his calculations. And it may not be irrelevant to state,' says the author of his Memoir in *The Gallery of Portraits*, 'what we believe has never yet appeared in print—that his talent for the science of numbers was only inferior to that for music: had he not been distinguished by genius of a higher order, it is probable that his calculating powers would have been sufficiently remarkable to bring him into general notice.'

Not long after he had completed his sixth year, the child excited the astonishment of his father by the production of a harpsichord concerto, methodically and correctly written, and wholly unobjectionable, except that it contained too many difficult passages. The appearance of such a phenomenon (for as such it could only have been viewed) determined the father to let the youthful prodigy be seen at some of the German courts. He first took him to Munich, where the elector received him and his family with every kind of encouragement. In 1762 the party proceeded to Vienna, and performed before the emperor Francis I., who was not less pleased by the vivacity of the boy than amazed by his powers. In the following year the Mozart family made an extensive European tour: in Paris they resided many months, where the youthful wonder performed on the organ in the Chapelle du Roi, before the whole court. There the party gave public concerts, and in that city, in the same year, Mozart published his two first works, when he had not finished his eighth year!

In 1764 the Mozarts arrived in London, and remained till the summer of 1765. 'Here,' says the above-mentioned memoir, 'the boy exhibited his talents before the royal family, and underwent more severe trials than any to which he had been before exposed, through which he passed in a most triumphant manner. So much interest did he excite in this country, that the Hon. Daines Barrington drew up an account of his extraordinary performances, which was read before the Royal Society, and declared by the council of that body to be sufficiently important to be printed in the *Philosophical Transactions*, in the 60th volume of which it appears.' And in the 69th volume of the same work, Dr. Burney remarks:—'Of Mozart's infant attempts at music I was unable to discover the traces from the conversation of his father, who, though an intelligent man, whose education and knowledge of the world did not seem confined to music, confessed himself unable to describe the progressive improvements of his son during the first stages of infancy. However, at eight years of age I was frequently convinced of his great knowledge in composition by his writings; and that his invention, taste, modulation, and execution in extemporary playing, were such as few professors are possessed of at forty years of age.' During this residence in our metropolis, he composed and published six sonatas, which he was permitted to dedicate to the queen of Great Britain. The family then returned to the Continent. At the Hague, Mozart published six more sonatas. The party now paid a second long visit to Paris, and returned to Salzburg in 1768. In the same year Mozart, by desire of the emperor Joseph II., composed an entire opera, *La Finta Semplice*, which was much commended by Hasse, who was then in high repute, and by Metastasio, but it never was publicly performed, is now unknown either as a whole or in part, and probably its chief merit was of a relative kind.

In 1769 Mozart, at the age of fourteen, was appointed director of the archbishop of Salzburg's concerts. Soon after he went with his father to Italy, and at Rome gave a remarkable proof of the power he possessed of fixing his attention, and of memory, by noting down the famous *Miserere* of Allegri, after his return from the pontifical chapel, where he had heard it performed. At Bologna he was introduced to the celebrated Padre Martini, who, after testing the youth's abilities, became one of his warmest admirers. While in that city, he was unanimously elected a member of the Accademia Filarmonica; and at Rome the pope conferred on him the order of the Golden Spur. At Milan, in 1770, he wrote and brought out his second opera, *Mitridate*, which was performed twenty nights consecutively. In 1773 appeared his *Lucio Silla*, which had twenty-six successive representations. In the same year he produced other works, among which were, an opera buffa, *La finta Giardiniera*, two Masses for the chapel of the elector of Bavaria, &c. In 1775, at the desire of the archduke Maximilian, he composed the cantata *Il Re Pastore;* and from that period till the year 1779 he continued to labour with his pen, though but few of its products then obtained, or ever will obtain, a celebrity at all equal to that which his subsequent productions have so justly acquired.

In November, 1779, Mozart finally settled in Vienna, the inhabitants and manners of which city were very agreeable to him; and now, having reached his twenty-fourth year, he exhibited the rare example of one who had been astonishing as a child, had disappointed not even the most sanguine hopes, and become proportionately great as a man. 'In his twenty-fifth year he was captivated by the charms of Madlle. Constance Weber, a very amiable person, and an accomplished, celebrated actress, to whom he soon made a proposal of marriage. This was courteously declined by her family, on the ground that his reputation was not then sufficiently established. Upon this he composed his *Idomeneo*, in order to prove what means were at his command, and, animated by the strongest passion that ever entered his heart, produced an opera which he always considered as his highest effort: certainly it was the first that showed his matured and positive strength. Portions of it are in his most original and grandest manner, but parts show that he had not quite emancipated himself from the thraldom of custom. Some of the airs, though far superior to those of his contemporaries, are too much in the opera style then prevailing, a style now become nearly obsolete; and when, fourteen years ago, it was wished to bring out *Idomeneo* at the King's Theatre, it became evident that, if performed as originally written, its success would be very doubtful. To Madlle. Weber, on whom the composer's affections were unalterably fixed, was assigned the principal character in the opera, and the high reputation which the author acquired by his work having immediately silenced the objections of Constance's family, her hand was shortly after the reward of his efforts.' (*Gallery of Portraits.*) The union proved a most happy one: in his wife he found an affectionate, active, zealous friend, a useful counsellor, and, when his health began to decline, a patient, unwearied, devoted attendant.

In 1782 Mozart produced *Die Entführung aus dem Serail* (*L'Enlèvement du Sérail*). It was at a rehearsal of this opera that Joseph II. said to the composer, 'My dear Mozart, this is too fine for our ears; it has too many notes.' 'I beg your majesty's pardon,' replied Mozart, with his characteristic independence, 'there are precisely as many notes as are necessary, and no more.' Joseph said nothing, though evidently embarrassed by the reply; but when the opera was performed and heard in a perfect state, he loaded it with praises. *Le Nozze di Figaro*, the *libretto* of which is well abridged from Beaumarchais' admirable comedy, was produced in 1786, by command of the emperor, 'by whose authority alone an Italian conspiracy against it was suppressed.' In the same year was brought out his *Schauspiel Direktor* (director of the comedy), a short opera, possessing little merit.

In 1787 appeared, at Prague, the *chef-d'œuvre* of Mozart, his *Don Giovanni*, the *libretto* made up, with considerable ability, by Lorenzo Da Ponte, from the many dramas founded on the same popular subject. This was received with enthusiasm by the Bohemians, but was then above the comprehension of the Viennese. Indeed the composer, aware of its superiority, and conscious that it would prove 'caviare to the general,' said—'I have written this opera to please myself and my friends.' And when it was performed, more than thirty years afterwards, at the Académie Royale at Paris, it was so little understood on the stage and in the orchestra, that Garat, the celebrated singer, exclaimed, 'Don Juan a paru incognito à l'opera.' It never found its way to our Anglo-Italian stage till the year 1817, 'when it was performed in a manner that surpassed all former representations, and has never since been equalled. The pro-

duction of *Don Giovanni* at the King's Theatre, which put ten thousand pounds into the lessee's pocket, and forms an era in our musical history, was so strenuously opposed by an Italian cabal, that but for the courage and perseverance of the director of that season, it would have been put aside, even after all the expense of getting up and trouble of rehearsing had been incurred.' The comic opera *Così fan tutte* was composed in 1790; *Die Zauberflöte* (*the Magic Flute*) in 1791, for M. Schickaneder, the proprietor of a theatre in the suburbs of Vienna, who himself wrote the almost incomprehensible *libretto;* and *La Clemenza di Tito* (abridged from Metastasio's beautiful drama) in the same year, for the coronation of Leopold II.

Had Mozart's life been extended but a few years longer, he would have repeated his visit to this country. When the spirited and liberal Salomon engaged Haydn to write symphonies for his concerts, and to repair to London in order to superintend their first performance, it was settled that Mozart should succeed his illustrious friend the following year, an agreement which death alone prevented from being carried into effect.

Of Mozart's symphonies, quintets, quartets, sonatas, &c., —of his masses, motets, detached vocal pieces, and many other works—we cannot afford space for even a bare list. His additional accompaniments to *The Messiah*, which exhibit such knowledge of effect, so refined a taste, and withal such respect for a composer whom he considered the greatest that had ever lived, prove that it is possible to decorate the lily and add fragrance to the violet. They were written for the Baron von Swieten in 1788; and we may venture to predict that this masterpiece of Handel will never again be heard unattended by these invaluable contributions of a congenial spirit.

The last, and, taken as a whole, the most sublime work of Mozart, his *Requiem*, was written on his death-bed; and having been left in rather an unfinished state in regard to minor details, his pupil, Süssmayer, filled up some of the accompaniments. This led, a few years ago, to a dispute concerning its authorship, an indiscreet friend of the latter having claimed as Süssmayer's composition the best parts of the Mass. The assertions by which the claim was supported, and the arguments in its favour, proved unavailing against the convincing evidence afforded by the work itself, and the controversy can never be successfully renewed. A story too that an anonymous mysterious stranger commissioned Mozart to compose the *Requiem*, raised many idle conjectures, some of them of the most grossly superstitious kind. The matter however has since been satisfactorily explained.

In bestowing on Mozart so abundant a share of genius and such exquisite sensibility, Nature seems to have thought that she had been sufficiently bountiful. Physical strength she denied him: small in stature, slight in construction, and feeble in constitution, he was not calculated to reach even the middle period of life. His health gradually declined, though his imagination continued in full vigour to the last, and an attack of fever, prevalent at the time in Vienna, hastened his dissolution, which took place on the 5th December, 1792. He left a widow and two sons· one of the latter adopted his father's profession, and is, we believe, still living, but inherits more of his parent's goodness of heart than of his talent. The other is in the employment of the Austrian government, at Milan. Mad. Mozart, at the expiration of many years, entered again into the matrimonial state with Baron von Nissen.

'It has been said of Mozart that his knowledge was bounded by his art, and that, detached from this, he was little better than a nonentity. That his thoughts were almost wholly bent on music was not a matter of choice, but of necessity. Had not his ill-remunerated labours occupied nearly all his time, his means would have been still more limited than they were, for a salary of less than a hundred pounds from the imperial court was all the permanent income he had to depend on. But his acquirements were far greater than is generally supposed, in proof of which we have the best authority for saying—(we quote again, and have an undeniable right, from the before-mentioned memoir)—that once, at a court masquerade given at Vienna, Mozart appeared as a physician, and wrote prescriptions in Latin, French, Italian, and German, in which not only an acquaintance with the several languages was shown, but great discernment of character and considerable wit. Assuming this (communicated to us by the late Mr. Attwood, his pupil and companion on the occasion) to be true, he could not have been a very ignorant man, nor always a dull one, out of his profession. But still stronger evidence in favour of his understanding may be derived from his works. That he who, in his operas, adapted his music with such felicity to the different persons of the drama—who represented the passions so accurately—who coloured so faithfully—whose music is so expressive, that without the aid of words it is almost sufficient to render the scene intelligible—that such a man should not have been endowed with a high order of intellect is hard to be believed; but that his understanding should have been below mediocrity is incredible.'

MUCIUS. [JUSTINIAN'S LEGISLATION.]

MUCUS. The recent researches of Dr. Henle of Berlin (*Ueber Schleim- und Eiter-Bildung*, in Hufeland's *Journ. der practisch. Heilk*, 1838), have determined the true composition of this substance, which had previously presented many qualities that appeared anomalous. He has proved that it is composed of the scales or cells of the epithelium, which covers all the open cavities of the body [MEMBRANES, MUCOUS], separated and suspended in a considerable quantity of watery fluid.

The epithelium, or cuticular covering of all mucous membranes, consists of one or more layers of minute cells; and it is deposited not only on the free surfaces of the large open cavities, but is continued into all the canals and ducts of glands that open on the mucous membranes. In different situations the form of the epithelium cells varies considerably; in some parts they are rounded, or polygonal and flat, adhering to each other in a continued membrane by their adjacent edges; in others they have a cylindrical or conical form, and are only attached to the mucous membrane by one of their extremities; in others they have also a cylindrical or conical form, and their free margins are beset with vibrating ciliæ.

By the contact of the foreign matters to which all the mucous membranes are exposed in the performance of their functions, or by other processes, the epithelium cells are constantly being removed, and their place is as constantly supplied by the formation of new cells from the surface beneath. Thus on all the mucous surfaces a more or less rapid process of desquamation and reproduction of cuticle is ever going on; the superficial layers scaling off, and deep layers being produced in a manner exactly similar to that in which, as the outer surface of the cuticle of the skin (the epidermis) is removed, fresh layers are deposited on the inner surface to replace them and maintain the thickness of the membrane.

The superficial layer of epithelium cells thus removed, not in dry scales, like the epidermis, but mixed with a quantity of watery fluid secreted by the surface of the mucous membrane,constitutes healthy mucus—a viscid, ropy, transparent, and apparently homogeneous substance, which is distinguished more especially by the presence of minute epithelium cells either floating separately or united into small membranous flocculi. Its chief chemical properties are that it mixes with any quantity of water without being dissolved, but swelling up and forming flocculi, does not dissolve in alcohol, and is not coagulated by heat.

The mucus is subject to various alterations by disease. In some cases, the epithelium, remaining healthy, is separated in a distinct membrane, as the cuticle is from the skin in blisters, by violence, &c. The quantity formed is also subject to great variation, and in many cases the structure of the cells composing it is altered. By these changes in the quantity, as well as in the composition and form, either of the watery secretion, or of the epithelium-cells, which together constitute mucus, all the morbid secretions of this class are produced. Thus all catarrhs, dysenteries, &c., consist essentially of a disease of the mucous membrane, which, instead of secreting the quantity and kind of epithelium sufficient for its protection from the substances that come in contact with it from without, secretes an unnatural quantity of watery albuminous fluid with epithelium cells of variously altered forms.

MUDAR. [CALOTROPIS.]

MUDSTONE, a local name for part of the 'Upper Silurian rocks' of Mr. Murchison.

MUEZZIN, in Mohammedan countries, is the general appellation of those officers or clerks of the mosques whose duty it is to cry out from the minaret gallery the ezann, or invitation to prayers, at the five canonical hours, namely, at

dawn, at noon, at four o'clock in the afternoon, at sunset, and at night-close. The muezzin cry is a substitute for bells, which are not used in Mohammedan countries. The words of the ezzan are:—'God is great; I attest that there is no other God but God: I attest that Mohammed is the prophet of God: come to prayers; come to the temple of salvation: God is great; there is no God but God.' Each of these sentences is repeated several times in succession, with pauses between, and in a kind of slow chanting, and occasionally shrill tone, forming a solemn though wild melody, peculiarly impressive, especially when suddenly breaking upon the silence of the night. On hearing the muezzin's call, the devout Mussulmans turn their faces towards Mecca, and recite their namaz, or prayers.

MUFFLE, a vaulted flat-bottomed earthen vessel in which substances may be strongly heated, and at the same time protected from the contact of the fuel; in this smaller vessels are placed containing the substances to be acted upon.

MUFTI, the general denomination of the head doctors of the law in Turkey, of whom there is one in every large town. The mufti of Constantinople is the highest in rank, and has a jurisdiction over the muftis of the provinces, and also over the medressés, or colleges, and generally over the whole body of the oulemas, or lawyers. He is styled sheikh ul islam, or 'chief of the elect,' and is consulted in important matters of law. He is appointed by the sultan, who can also depose him. His decisions, called 'fetwahs,' are written in a laconic style, and he assigns no reasons for his judgment. His secretary, called fetwah eminé, has an office with about twenty clerks for the despatch of business. The dignity of sheikh ul islam is one of the principal in the empire, and is equal in rank to that of grand-vizier. His dress is of white ermine. Mouradja d'Ohsson, in his 'Tableau de l'Empire Ottoman,' gives several specimens of the 'fetwahs.'

MUGGLETONIANS, a sect of Christians which arose in England in the year 1651. The leaders of this sect were Lodowicke Muggleton, a journeyman tailor, and John Reeve, who asserted that they had been appointed by an audible voice from God, as the last and greatest prophets of Jesus Christ, that they were the two witnesses mentioned in the 11th chapter of the Revelations, and that they had power to bless or damn to all eternity whomsoever they pleased. They published a great number of works, and obtained many followers. The chief writers against them were the Quakers, and among these, George Fox and William Penn. On the 17th of January, 1676, Muggleton was tried at the Old Bailey, and convicted of blasphemy. He died on the 14th of March, 1697, at the age of 88.

It is impossible here to give a full account of the strange doctrines of this sect. The chief articles of their creed appear to have been, that God has the real body of a man, that the Trinity is only a variety of names of God, that God himself came down to earth, and was born as a man and suffered death, and that during this time Elias was his representative in heaven. They held very singular and not very intelligible doctrines concerning angels and devils. According to them the soul of man is inseparably united with the body, with which it dies and will rise again.

A complete collection of the works of Reeve and Muggleton, together with other Muggletonian tracts, was published by some of their modern followers, in 3 vols. 4to., 1832. Among the works written against them are the following: 'The New Witnesses proved Old Hereticks,' by William Penn, 4to., 1672; 'A True Representation of the Absurd and Mischievous Principles of the Sect commonly known by the name of Muggletonians,' 4to., Lond., 1694.

MUGI'LIDÆ (or fishes of the Mullet tribe), a family of fishes of the order Acanthopterygii. This family may be distinguished by the following characters:—body nearly cylindrical, covered with large scales; dorsal fins (two in number) separated, the first with only four spinous rays; the ventral fins have their origin a little behind the line of the pectorals; branchiostegous rays, six. The head is somewhat depressed, and, like the body, is covered with large scales or polygonal plates; the muzzle is very short; the mouth is transverse, and when closed forms an angle, the lower jaw having an eminence in the middle, which fits into a corresponding hollow in the upper; teeth very minute; pharyngeal bones much developed.

The grey mullet (*Mugil capito*, Cuvier), a fish not uncommon on many parts of the British coast, will serve to illustrate this group. It is rather more than one foot in length: the length of the head, compared with that of the body and tail, is as one to four; the greatest depth of the body, which is beneath the first dorsal, is about one-fourth the whole length, excepting the tail; the head is broad and depressed, snout rounded; the skin of the anterior and posterior margins of the orbit does not advance over the eye; first dorsal fin commences about the middle of the body, its height is equal to twice its length; between the first and second dorsal there is a considerable interval; its proportions, as regards height and length, the same as the first: the upper surface of the body is dusky-grey, tinged with blue; the sides and belly are silvery-white, marked with longitudinal dusky lines; fin membranes dirty-white; a dark spot on the base of the pectoral fin

The thick-lipped grey mullet (*Mugil chelo*, Cuvier), according to Mr. Couch's MSS, communicated to Mr. Yarrell, seems to be abundant on the coast of Cornwall, but no other British naturalists appear to have noticed it. It is distinguished from the common grey mullet chiefly by its large and fleshy lips, the margins of which are ciliated; the teeth resemble hairs; the maxillary bone curved, and showing itself behind the commissure.

A third species of mullet is added to the list by Mr. Yarrell, who proposed for it the specific name of *curtus*, from its comparatively short form. 'The length of the head, as compared with that of the body and tail, is as one to three, the proportion in the common grey mullet being as one to four; the body is also deeper in proportion than in *M. Capito*, being equal to the length of the head: the head is wider, the form of it more triangular, and also more pointed anteriorly; the eyes larger in proportion; the fin rays longer, particularly those of the tail; the ventral fins placed nearer the pectoral, and a difference exists in the number of some of the fin rays: the colours of the two species are nearly alike; and in other respects, except those named, they do not differ materially.' (Yarrell's *British Fishes*.) Mr. Yarrell caught this new species at the mouth of Poole harbour.

MÜHLHAUSEN, in France. [MULHAUSEN.]

MÜHLHAUSEN, the capital of a circle of the same name, in the government of Erfurt, in Prussian Saxony, is in 51° 13′ N. lat. and 10° 28′ 45″ E. long. It is situated in a very pleasant country on the banks of the Unshut, which is here joined by the Schwemmotte, which flows through the town. It is surrounded with walls and ditches, has four gates, and consists of the upper and the lower town and four suburbs. There are four Lutheran churches, of which that dedicated to the Virgin Mary and the cathedral of St. Blasius are worthy of notice. Among the charitable institutions are an infirmary, three hospitals, and an orphan asylum. The town possesses a gymnasium, numerous parochial and other schools, a society for the promotion of industry, and other useful societies. The population is nearly 12,000. The manufactures of woollen cloth, serges, calicoes, leather, snuff, and tobacco, are very considerable. The breweries, distilleries, and tanneries are flourishing. Large quantities of starch, glue, and oil are made here. There are likewise dyeing-houses and fulling-mills, and the manufacturers of the neighbouring district of Eichsfeld send their woollens to Mühlhausen to be fulled, dyed, and prepared for the market. The inhabitants carry on a very great trade in their own manufactures and in corn. Mühlhausen was one of the oldest free cities in Germany; it boasted of having enjoyed its liberty from time immemorial, and preserved its democratical form of government till 1802, when the town and territory were assigned to Prussia, and finally confirmed to that power in 1814.

MULBERRY. The black or common mulberry is the fruit of *Morus nigra*, the only species of Morus worthy of being cultivated as a fruit-tree. It is a native of Persia, and its indigenous range appears to be extensive. Its introduction to this country dates about the middle of the sixteenth century. Under great vicissitudes it proves very tenacious of life; and under ordinary circumstances it attains, even in this climate, a considerable age, for some trees planted in 1548 are still alive. The fruit is used at the dessert, fresh gathered, and at the same time it ought to be so ripe as to be just ready to drop from the tree; indeed the fruit may be said to be in the highest perfection with regard to ripeness when it actually drops, and hence a grass plot surrounding the trunk is desirable; but the trees

are found to thrive better when the soil is kept stirred: however, as grass will be generally preferred, all strong-growing sorts of grasses should be avoided; and it should also be kept very closely mowed till at least immediately before the fruit ripens. By this means the sun's rays will be permitted to penetrate the soil to a greater depth than when obstructed by a covering of long grass. Mulberries are also preserved in the form of a syrup; and their juice, mixed with that of apples, forms a beverage of a deep port-wine colour, called mulberry cider.

The soil for mulberry-trees should be of a light, rich, and moderately dry nature. If the subsoil be not naturally pervious, it should be rendered as much so as is possible. A good bottoming of brick rubbish will prove beneficial with regard both to the growth of the tree and the flavour of the fruit.

Propagation of the mulberry may be effected either by seeds, cuttings, or layering. The last is the preferable mode, where it can be conveniently adopted; and the shoots or branches used for this purpose, as also those intended for cuttings, should be selected from those trees, or parts of a tree, that have been observed to be most fruitful; for although the plant is generally monœcious, yet some trees occasionally assume a diœcious character. Hence likewise seedling plants are not so desirable as those propagated from trees previously ascertained to be prolific; and moreover seedling plants are a greater number of years in attaining a bearing state.

As the acquisition of a good mulberry-tree is very desirable, the following directions for obtaining a bearing tree readily and quickly will be useful. If a tolerably large branch of a vigorous tree is 'ringed,' and the annulation is enclosed in a box filled with rich soil, sufficiently large to hold as much as will preserve a somewhat uniform temperature, or at least an approximation to that which the roots of a tree naturally experience in the ground, roots will be readily emitted into the earth, and in due time the branch may be cut off and planted. A covering of moss is useful, partly for maintaining an equable temperature, and partly for preserving moisture.

The mulberry-tree requires very little pruning beyond that of regulating the head. The season for this operation should be always mid-winter; for if in a growing state, this plant bears amputation very ill, especially as regards large limbs. Mulberries have been trained against south walls, over which a single plant has been known to extend upwards of ninety feet horizontally; additional size and flavour are said to have been gained, but certainly not so much over a standard on a proper bottom as to compensate for the great extent of wall-room occupied.

Medicinal Uses.—The fruit (popularly, but incorrectly, termed a berry) of *Morus nigra* is used in medicine. It is formed by a partial union of the enlarged and fleshy calices, each enclosing a dry membranous pericarp. It is at first green, then red, and lastly of a deep violet-black, having much juice of a like colour. It contains much mucilage, with an astringent resin, and is sweetish and subacid, owing to the presence of some malic or tartaric acid. As the cooling properties depend on the acid, the fruit should be gathered before it is quite ripe. It may either be formed into a syrup, or a vinegar may be made with it similar to raspberry vinegar, which constitutes an excellent gargle in inflammatory sore-throat, and a drink in slight febrile affections. It is also susceptible of many other uses, economic or domestic. The fruit of the blackberry (Rubus fruticosus) is sometimes substituted for that of the mulberry, but it is not acid.

MULCASTER, RICHARD, was a native of Carlisle, and of an old family in Cumberland. He received his earliest education on the foundation at Eton, under the celebrated Udal, whence, in 1548, he was elected scholar of King's College, Cambridge. From Cambridge he removed to Oxford, and in 1555 was chosen student of Christ Church. In the next year he was licensed to proceed in Arts, and about the same time became known for his proficiency in Eastern literature. He began to teach in 1559; and on September 24, 1561, for his extraordinary attainments in philology, was appointed the first master of Merchant Taylors' school in London, then just founded. Here he continued till 1586, when he resigned; and some time after was appointed upper master of St. Paul's School. Here he remained twelve years; and then retired to the rectory of Stanford Rivers, in Essex, to which he had been instituted at the presentation of the queen, and where he died, April 15th, 1611. Several of his smaller compositions, commendatory verses, &c. are prefixed to works of his contemporaries; and Gascoigne has printed some Latin verses of his composition, which were spoken before the queen at Kenilworth, in 1575. His separate works were: 1, his 'Positions, wherein those primitive circumstances be examined which are necessarie for the training up of Children, either for skill in theire book or health in their bodie,' 4to., Lond., 1581 and 1587; to which a second part was promised. 2, 'The first part of the Elementarie, which entreateth chefely of the right writing of the English tung,' 4to., Lond., 1582, a book which Warton (*Hist. Engl. Poetr.*) says contains many judicious criticisms and observations on the English language. 3, 'Catechismus Paulinus, in usum Scholæ Paulinæ conscriptus, ad formam parvi illius Anglici Catechismi qui pueris in communi Præcum Anglicarum libro ediscendus proponitur,' 8vo., 1601. This is in long and short verse, and, though now forgotten, was once esteemed. Fuller relates that Mulcaster was a severe master, but much beloved by his pupils in after-life, and by none more than by Bishop Andrews. (*Gent. Mag.*, vol. lxx., pp 420, 604; Wilson's *Hist. of Merchant Taylors' School*, vol. i., p. 78, &c.; Chalmers's *Biogr. Dict.*, vol. xxii., p. 501.)

MULE. This word is, in its particular sense, used to denote the offspring of the male ass and the mare [Horse, vol. xii., p. 314]*; but, in its general signification, it is applied to the offspring of any two animals of distinct species, and is then synonymous with the term 'Hybrid.' [Hybrid, vol. xii., p. 374.]

'The true distinction between different species of animals,' writes John Hunter,† 'must ultimately, as appears to me, be gathered from their incapacity of propagating with each other an offspring capable again of continuing itself by subsequent propagations: thus the horse and ass beget a mule capable of copulation, but incapable of begetting or producing offspring. If it be true that the mule has been known to breed, which must be allowed to be an extraordinary fact, it will by no means be sufficient to determine the horse and ass to be of the same species; indeed from the copulation of mules being very frequent, and the circumstance of their breeding very rare, I should rather attribute it to a degree of monstrosity in the organs of the mule which conceived, as not being a mixture of two different species, but merely those of either the male or female ass. This is not so far-fetched an idea, when we consider that some true species produce monsters which are a mixture of both sexes, and that many animals of distinct sex are incapable of breeding at all. If then we find nature in its most perfect state deviating from general principles, why may it not happen likewise in the production of mules, so that sometimes a mule shall breed from the circumstance of its being a monster respecting mules?' We think that the views here laid down are clear and satisfactory so far as they go, and that the question with which the paragraph concludes is in no danger of a contradictory answer.

But the student should be on his guard as to an unhesitating admission of everything that is laid down even by an authority so deservedly eminent as that of the great physio-

* Mr. Darwin, in his highly interesting 'Journal and Remarks,' being the third volume of the 'Narrative of the Surveying Voyages of H.M. ships Adventure and Beagle,' gives the following graphic account of the social habits of the Mule, when describing the passage of the Cordillera. 'Our manner of travelling was delightfully independent. In the inhabited parts we bought a little firewood, hired pasture for the animals, and bivouacked in the same field with them. Carrying an iron pot, we cooked and ate our supper under the cloudless sky, and knew no trouble. My companions were Mariano Gonzales, who had formerly accompanied me, and an "arriero," with his ten mules and a "madrina."'

'The madrina (or godmother) is a most important personage. She is an old steady mare, with a little bell round her neck; and wheresoever she goes, the mules, like good children, follow her. If several large troops are turned into one field to graze, in the morning the muleteer has only to lead the madrinas a little apart, and tinkle their bells; and although there may be two or three hundred mules together, each immediately knows its own bell, and separates itself from the rest. The affection of these animals for their madrinas saves infinite trouble. It is nearly impossible to lose an old mule; for if detained for several hours by force she will, by the power of smell, like a dog, track out her companions, or rather the madrina; for, according to the muleteer, she is the chief object of affection. The feeling however is not of an individual nature; for I believe I am right in saying that any animal with a bell will serve as a madrina. In a troop each animal carries, on a level road, a cargo weighing 416 pounds (more than twenty nine stone); but in a mountainous country, a hundred pounds less. Yet with what delicate slim limbs, without any proportional bulk of muscle, these animals support so great a burden! The mule always appears to me a most surprising animal. That a hybrid should possess more reason, memory, obstinacy, social affection, and powers of muscular endurance, than either of its parents, seems to indicate that art has here out-mastered nature.'

† 'Observations tending to show that the Wolf, Jackal, and Dog are all of the same species.' See Professor Owen's edition of John Hunter's 'Observations on Certain Parts of the Animal,' London, 8vo., 1837.

logist whose opinion we have just quoted. Professor Owen, for instance, in one of his valuable notes on another part of this very paper, truly observes that John Hunter's assertion that the fertility of a hybrid with an individual of a pure breed proves the fact of identity of two supposed distinct species equally with the production of offspring from the connection of hybrid with hybrid, cannot be admitted. 'To prove the identity of two supposed distinct species,' continues the Professor, 'granting the fertility of the hybrids from the two to be the proof required, it should be shown that such hybrids are fertile *inter se*, and capable of propagating indefinitely an intermediate variety. Now this is precisely the fact which is wanting in the evidence adduced in the text. All that Hunter proves is that two species very nearly allied to each other will produce a hybrid offspring, and that the hybrid is again productive with an individual of the pure breed; but this only illustrates a general law by which the reversion of the hybrid to the pure breed is provided for; while, on the other hand, the intermixture of the distinct species is guarded against by the aversion of the individuals composing them to a sexual union.' And it is no contradiction to this general rule to show that in some instances this aversion is overcome, as in the case of the lion and tigress—to cite an example, among the *Carnivora* [LION, vol. xiv., p. 35], and in that of the pheasant and common fowl; and the hen canary-bird with the goldfinch, linnet, &c., among birds. [CANARY-BIRD, vol. vi., p. 228.] Such cases are the exceptions, and prove the generality of the rule or law.

Doubtless there must be a concurrence of predisposing accidents to bring different species, in their anxious desire to obey the all-powerful impulse of reproduction, together; and the presence of such predisposing causes may be generally traced in most of these erratic alliances. In the great majority of them the species thus mingled are very nearly allied. Thus there are several instances on record of the Hooded Crow (*Corvus Cornix*) pairing and producing offspring with the Carrion Crow (*Corvus Corone*); the male of Montagu's Harrier (*Circus hyemalis*) and a Ringtail (*Circus cyaneus*) having been shot at the nest feeding their young (Yarrell, *ex relatione* Sweeting). Mr. Berry notices the pairing of a Blackbird and a Thrush in Lancashire: these birds reared their broods, which were strongly marked hybrids, for two successive years. (*Magazine of Nat. Hist.*, vol. vii.)

Mr. Yarrell, who, in his beautifully illustrated and interesting 'History of British Birds,' now in course of publication, mentions the last-named cases in detail, adds that several instances are known in which the female of the Black Grouse, usually called the Grey Hen, has bred in a wild state with the Common Pheasant; such a hybrid is represented in the title-page of Mr. T. C. Eyton's 'History of the Rarer British Birds.' [BLACK GROUSE, vol. iv., p. 483.] The last-named ornithologist has also recorded the fruitful connection between the Common Goose and the Chinese Gander; and the Hon. Twiselton Fiennes communicated to the Zoological Society of London an instance of the Common Wild Duck breeding with the male Pintail (and see further DUCKS, vol. ix., pp. 181, 182).

The author of the 'History of British Birds' above quoted has had so much experience on this intricate subject, so far as it relates to birds, that the following observations by him are worthy of all attention :—

'Several experiments on the productive powers of various hybrid birds are now in progress; but without intending to anticipate the interesting particulars which may be elicited, I may briefly refer to what has fallen under my own observation. Some degree of restriction, either accidental or imposed, and arising from various causes, appears to be necessary to induce the union of birds that are of different species; but the influence of the divine command to "increase and multiply" is so irresistible, that some birds unite with strange partners, rather than have no partner at all; when putting two birds of different species together, with the intention of breeding from them, union is less likely to take place if they are kept within sight or hearing of other birds of their own species. The two sexes of the broods produced by such unions take little or no notice of each other when adult, even during the usual breeding season, and are believed to be unproductive among themselves if so restricted; but if allowed an opportunity of uniting with the true species of either parent, they are then prolific, and the young birds produced soon lose all intermediate character.' (*Hist. Brit. Birds*, part xiii.)

Our limits will not permit us further to pursue the zoological part of this subject, one of the most interesting that can be presented to the practical breeder or to the physiologist, who will anxiously expect the results of the experiments above alluded to by Mr. Yarrell.

MULHAUSEN, or MULHOUSE, properly written *Mühlhausen*, a town in France, in the department of Haut Rhin, situated on the banks of the Ill, a feeder of the Rhine, in 47° 45′ N. lat. and 7° 21′ E. long., 237 miles in a direct line east-south-east of Paris, or 278 miles by the road through Troyes, Langres, Vesoul, Belfort, and Altkirch.

This town derived its origin and its name from a house and a mill established on the Ill by the friars hermits of the order of St. Augustin. In the eighth century it is noticed as a village, and from 1268 it ranked as a free imperial city. It was long time harassed by the landgraves of Alsace, whose attacks induced the townsmen to ally themselves, in 1466, with the Swiss Cantons of Berne and Soleure, in 1506 with Basel, and in 1515 with the whole Helvetic Confederacy, of which it may be considered to have become a member. These alliances procured to the townsmen peace and security; and Mulhausen, with its small territory, though surrounded on every side by France, preserved its separate existence till A.D. 1798, when it was incorporated with the French republic. It has ever since remained incorporated with France.

Mulhausen is divided into the old and new towns. The old town is built on an island formed by the Ill, which here flows in several channels, and is crossed by a number of bridges. The town forms an irregular oval, with streets, crooked indeed, but tolerably broad and well paved, and with well-built houses. There are a Catholic and a Protestant church, a town-hall, and a high school. The new town, to the south-east of the old town, is on the right bank of the Ill; the streets are straight, provided with foot-paths, and adorned with handsome houses

The population of the commune of Mulhausen at the commencement of the century was 6628; in 1831 it had increased to 13,300, of whom 13,187 were in the town. Besides the resident population, 7000 workmen daily resort to the town from the neighbouring communes to follow their several employments. It is the centre of the trade of the department, and of the manufacture of printed cottons and silks, so much esteemed for their brilliant and fast colours, a manufacture which employs, in this and the neighbouring districts, nearly 80,000 persons. There are manufactures of cotton and woollen yarn, of excellent muslins, and other cottons, of fine and ordinary woollen cloths, of cotton hose, straw hats, morocco leather, and soap. There are dye-houses, tan-yards, metal-foundries, and establishments for making steam-engines and other machinery. A commercial gazette is published. There are four yearly fairs.

The Canal de Monsieur, which unites the navigation of the Rhône and of the Rhine, passes by the town; there is a large basin for boats in the new town.

MULI'NIA, Mr. Gray's name for a genus of conchifers, allied to *Mactra*, having the ligament, properly so called, internal, and the lateral teeth simple.

MULL, an island on the western coast of Scotland, in the synod and county of Argyll, comprised between 56° 16′ and 56° 40′ N. lat., and 5° 45′ and 6° 23′ W. long. Its length from north to south is 30 miles, and the greatest width, from Treshnish point on the west coast to Craiganure Kirk on the east, is 23 miles. To the north the island is bounded by Loch Sunart and the headland of Ardnamurchan, to the south by Loch Linnhe, and to the west by the Minsh channel. On the north-east it is separated from the mainland by a narrow strait called the Sound of Mull. The coast is indented by numerous lochs and bays. Of the former the principal is Loch-na-Keal on the western side, which enters so far inland that its extremity is separated from the Sound of Mull by an isthmus only two miles in width, thus dividing the island into two unequal parts, whereof the northern forms the parish of Kilninian, and the southern the parishes of Kilfinichen and Torossay. At the entrance of this loch are a number of small islands, including Ulva, the Treshnish islands, and Staffa, noted for its basaltic cave and columns. The island terminates to the south-west in a headland called Rossy, or the Ross of Mull, a short distance off which is Iona. [IONA.] The substance of the island is principally trap rock. The highest

mountain, called Beinmore or Benmore, signifying in Gaelic 'the great mountain,' is situated near the southern shore of Loch-na-Keal, and is 3168 feet in height. The ascent is not difficult, and the summit commands a fine view of the neighbouring islands.

The interior of Mull is designated by Dr. M'Culloch (*Western Isles*, 8vo., Lond., 1824) as 'trackless and repulsive, rude without beauty, stormy, rainy, and dreary.' It appears however (Sinclair's *Statistical Acc. of Scotland*, 8vo., Edin., 1792, iii., p. 265) that in 1792 a road had been constructed from Achanacreig on the east coast, to Across on the Sound of Mull, a distance of twenty miles, and in that space there were five stone bridges. In the parish of Kilninian it was otherwise; many torrents intersected the roads, which, for want of bridges, were frequently impassable.

The greater part of the island is the property of the duke of Argyll. The soil, where the surface is not covered with crags, heath, or swampy morasses, consists of loam and clay. Hemp, flax, oats, barley, and potatoes are cultivated, but the cultivation is inferior to that of the adjacent islands, and the grain produced in the most plentiful seasons is barely adequate to the support of the inhabitants. (Hiron, *General View of the Hebrides*, Edin., 4to., 1794.) The principal object of the farmer is the breeding of sheep and black cattle. Of the latter the average annual export is 2000 head, including the oxen from the isles of Coll and Tir-y, which are driven through Mull on their way to the lowlands. The horses are small but hardy. Their breed is said to have been improved by mixture with those from the 'Florida,' a vessel of the Spanish Armada wrecked off the coast. The fair for horses is held on the 21st of August. Grouse, woodcocks, and ptarmigans are frequently met with, and red deer are sometimes taken on the mountains. The kelp produced along the shores is considerable.

The principal town or village is Tobermorry, on the north-eastern point of the island. It has a harbour, pier, inn, and custom-house, at which all the legal forms connected with the herring-fishery have to be gone through. Boat-building is carried on to a small extent.

The three parishes into which Mull is divided contained, in 1831, an aggregate population of 10,538 persons, distributed among 2031 families, of whom 1297 were employed in agriculture.

In the parish of Torossay, in 1792, there was a parochial school, and two others supported by the Society for the Propagation of Christian Knowledge.

(Langland's *Large Map of Argyllshire*; *Population Returns*, &c.)

MÜLLER. [REGIOMONTANUS.]

MÜLLER, OTHO FRIDERIC, a Danish naturalist, born at Copenhagen, March 11, 1730. His parents were poor; but being fond of literary pursuits, and of studious and regular habits, he obtained in 1753 an appointment as tutor to a young nobleman, the count de Schulin. In this situation he had ample opportunities for cultivating his taste for reading and for the observation of nature. It is said that the countess de Schulin, his pupil's mother, who was a woman of great ability, persuaded Müller to devote his talents to natural history, for we find that previously to this time his principal study had been theology. Botany seems to have engaged his attention (though he owes his celebrity to his zoological researches), and he employed his leisure time in collecting plants, and in making drawings of them. He subsequently travelled for a considerable time in different countries with his pupil, and so greatly extended his knowledge of natural history, that on his return to Copenhagen, in 1767, he was a first-rate botanist and zoologist. Marrying soon after a woman with considerable property, he resigned all his professional engagements, and devoted the remainder of his life to the pursuit of science.

In 1763 he published a work on fungi, in Danish, which was followed by a history, in two volumes (which came out separately), of the species of insects and plants inhabiting that part of the country in which he resided. It was written in Latin, and entitled 'Fauna Insectorum Friedrichsdaliana,' 8vo., Leipzig, 1764; and 'Flora Friedrichsdaliana,' 8vo., Strasburg, 1767. These works showed much method, and great accuracy in the investigation of specific characters, which qualities procured him considerable reputation; and he had the honour of being appointed to continue the publication of the 'Flora' of Denmark, a superb work, undertaken by the command of king Frederic V., who was a great patron of science. It had been commenced in 1761, by George Christian Oeder, who brought out three volumes; Müller added two others, the last of which appeared in 1782. Müller however now took more interest in the study of minute animals than of plants, and he published in 1771, in German, a work on 'Certain Worms inhabiting Fresh and Salt Water,' 1 vol. 4to., Copenhagen. He here particularly described those annulose animals which Linnæus had called *Aphrodites* and *Nereides*, whose reproductive powers, as observed by Bonnet, possess so much interest. Müller divided them into four genera, and described a great many new species, besides adding much interesting information concerning their structure and habits. He displayed still greater powers of observation in the next work which he published, in Latin, named 'Vermium Terrestrium et Fluviatilium, seu Animalium Infusorium, Helminthecorum, et Testaceorum non Marinorum, succincta Historia,' 2 vols. 4to., Copenhagen and Leipzig, 1773-74. The first part is devoted to the infusory animalcules, of which he discovered a great many new species. He was the first naturalist who attempted to arrange these minute animals into genera and species, assigning to each distinctive characters. The second part of this work contains some interesting observations on intestinal worms; and the third, which fills the second volume, is devoted to the testaceous mollusca, which the author attempted to classify according to the organisation of the animals inhabiting the shells; but, as Cuvier has remarked, their structure was too little known at that time, and Müller was not enough of a comparative anatomist to be very successful in this attempt. His treatises on the 'Hydrachnæ in Aquis Daniæ Palustribus detectæ et descriptæ,' 4to., Leipzig, 1781, and on the 'Entomostraca, &c.' (little shelled crustaceans inhabiting fresh waters, which were comprised by Linnæus in the genus *Monoculus*), 4to., Leipzig, 1785, are monuments of patient investigation; they are both written in Latin, and are accompanied with a great number of plates. Müller here described a vast number of animals whose existence was previously scarcely suspected, though they are contained by millions in all fresh waters.

The subject in which he took the greatest interest was the microscopic investigation of infusory animalcules: he worked at this incessantly, and at his death (which took place on the 26th of December, 1784) he left a history and detailed description of this class of minute animals, illustrated with 50 plates. This work was published in 1786, by his friend Otho Fabricius, in 4to. (Hauniæ); it is written in Latin. 'These three works, on the Infusoria, Monoculi, and Hydrachnæ, have procured Müller,' says Cuvier, 'a place in the first rank of those naturalists who have enriched science with original observations.' He classified each of these families of animals, and his arrangement remained unaltered for many years, partly owing to the great care and exactness with which he formed his system, and partly in consequence of the many difficulties with which the investigation of these microscopic animals is surrounded. The Infusoria were a new kingdom of animals which he revealed to the naturalist, and previously to the modern researches of Ehrenberg his labours stood alone in this branch of science. [INFUSORIA.]

In 1779 Müller commenced the magnificent 'Zoologica Danica,' a work which was intended to correspond, in the animal kingdom, to the 'Flora Danica' in the vegetable. He only lived to publish two parts, which were in folio, each containing 40 coloured plates. The text, which was in Latin, appeared first in 8vo., but was reprinted in 1788, of the same size as the plates. Two other parts of the 'Zoologica Danica' have since been published, the first by M. Abildgaart, and the other by M. Rathké: the last appeared in 1806. This work, which was intended to embrace all the species of the animal kingdom found in the north of Europe, still remains very incomplete, only 160 plates having appeared. It is however very valuable, from its containing descriptions and figures of a great number of new species of molluscous animals and zoophytes.

Besides the great works which we have mentioned, Müller wrote a general catalogue of the animals of Denmark, entitled 'Zoologicæ Danicæ Prodromus,' 8vo., Copenhagen, 1777, and several memoirs on different subjects. The Danish government marked their sense of the merits of this laborious naturalist by making him a counsellor of state, and giving him several other honorary appointments.

MÜLLER, JOHN, born at Schaffhausen, in Switzerland, in 1752, was the son of a clergyman and schoolmaster in his native town. He studied at Göttingen, under Heyne, Schlœzer, Walch, and other eminent professors, and showed an early taste for historical research. On his return to Schaffhausen he was appointed professor of Greek in the gymnasium of that town. He afterwards went to Geneva, as tutor to the children of Counsellor Tronchin of that city, where he became acquainted with the naturalist Bonnet, Bonstetten, and other learned men. With Bonstetten he formed an intimacy which lasted till his death. In 1778 he delivered a course of lectures on universal history, which were afterwards published in twenty-four books. It is a rapid but well-written abridgment, and useful to young people.

Müller shows no partiality for great states and empires, and he bestows particular notice upon small communities which have struggled hard and succeeded in maintaining their independence. He gives some interesting particulars not generally known of the history of the republics and little states of modern Europe, such, for instance, as Ragusa. He exposes, without partiality, the defects and errors of all governments, antient and modern, republics as well as monarchies. The work ends with a review of the political situation of Europe in 1783. Müller's 'Universal History' was translated into French, 'Histoire Universelle, par Jean de Müller,' 4 vols. 8vo., Paris, 1813-17.

In 1781 Müller was appointed professor of history at Cassel, where he published a treatise 'On the Influence of the Antients upon the Moderns,' and another on the establishment of the temporal dominion of the popes in the eighth century. About the same time he published the first volume of his great work, which has placed him in the first rank of historians, his history of the Swiss confederation, 'Geschichte der Schweizerischer Eidgenossenschaft,' which he afterwards brought down to the end of the fifteenth century. The author traces the rise of the towns and small communities of Helvetia through the gloom of the dark ages, and gives minute particulars of their customs, manners, and laws, referring at every step to authentic documents. It is a work of vast and deep research, and, though necessarily minute, is yet attractive in its style. The interest and value of the work, as a book of historical reference, are not confined to the narrow ground of Swiss politics; it serves also to illustrate the early history of the Teutonic nations in general.

In 1786 Müller was appointed librarian and counsellor of state to the elector of Mainz. In 1792, when the French took that city, he repaired to Vienna, where the emperor Leopold II. gave him an official appointment as a member of the privy chancelry. He there wrote several political pamphlets tending to show the necessity of a close union and harmony among the various German states in that great crisis. In 1800 Müller was appointed first keeper of the imperial library. In 1804 he left Vienna for Berlin, where he published some essays on the history of Frederic the Great, and also a treatise on the decline of liberty among the antients. After the battle of Jena in 1806, Napoleon saw Müller at Berlin, and showed him a marked regard, which seems to have captivated the historian. In 1807 Napoleon appointed him secretary of state to the new kingdom of Westphalia, under his brother Jerome, an office which he exchanged in the following year for that of director of public instruction. He entered with zeal upon his new and arduous duties, which however he could not long pursue, as he died at Cassel, in May, 1809. His complete works were published at Tübingen in 27 vols., 1810-19. Müller's letters to his friend Bonstetten were published separately by J. H. Füssli; 'Briefe an seinen ältesten Freund in der Schweiz, in den Jahren 1771 bis 1807,' 8vo., Zürich, 1812. They are very interesting as records of the times. Müller's history of Switzerland was translated into French and continued to the epoch of the French Revolution by P. H. Mallet; but a much superior translation is now being published by Professor Monnard of Lausanne and L. Vulliemin, who have also undertaken to continue Müller's work down to the present time. 'Histoire de la Confédération Suisse par Jean de Müller, Robert Gloutz Blozheim, et J. J. Hottinger; traduite de l'Allemand et continuée jusqu' à nos jours, par Charles Monnard et Louis Vulliemin,' 8vo., Paris and Geneva, 1837-9. Five or six volumes of the work have already appeared, and the notes by the editors are copious and valuable; when finished, it will form a complete history of Switzerland. Heeren wrote a biographical notice of Müller, Leipzig, 1809.

MÜLLER, WILHELM, a modern German writer and lyric poet of great talent, was born at Dessau, Oct. 7th, 1794. More ardent and industrious than methodical in his studies, he nevertheless avoided a mere desultory course of reading. He applied himself more particularly to antient German literature and poetry, the fruits of his researches into which were first given to the public in his 'Blumenlese aus den Minnesänger,' 1816. His next production of any note was a translation of Marlowe's 'Faustus' [MARLOWE], in 1818, which was succeeded by his 'Rom, Römer, and Römerinnen,' 2 vols., 1820, a graphic and clever sketch of the papal capital and its inhabitants, the result of a tour which he made in Italy with Baron von Sack, and which he designed to extend into Greece. His literary reputation was afterwards greatly increased by his 'Gedichte aus den hinterlassenen Papieren eines reisenden Waldhornisten,' and his 'Lieder der Griechen.' The latter breathe a very high spirit of enthusiasm; nor are the beauty and melody of the language inferior to the energy of the sentiments. Many tales and other productions of that class by him appeared in the 'Urania' and other literary annuals; and he also contributed several articles to Ersch and Gruber's 'Encyclopædia.' He died, October 1, 1827.

MULLE'RIA. [OSTRACEA.]

MULLET. [HERALDRY.]

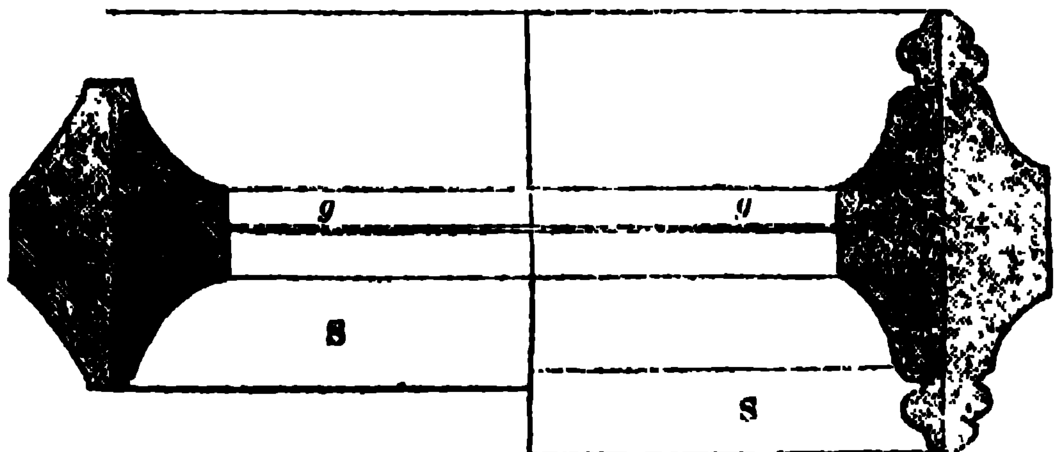
MULLINGER. [MEATH, WEST.]

MULLION (by some supposed to be a corruption of *munnion*, from the Latin *munio*, to defend or strengthen, or else to be derived from the French *moulure*, a moulding), a term in Gothic architecture applied to the upright bars, or rather stone shafts, dividing the general aperture of a window into secondary openings, which are again frequently subdivided vertically by a similar shaft crossing the mullions horizontally, and therefore called a *transom*; whereby the whole space beneath the head of a window (supposing it to be an arched one) is formed into a series of pannels in which the glass is fixed, and which are sometimes technically distinguished as *lights* or *days*. Except in very small windows not exceeding in width one such *light* or compartment, mullions invariably occur in Gothic windows, being in fact absolutely necessary when no other mode of glazing was practised than that of small panes set in lead, because without some kind of strengthening or support, either by stone or metal rods, a spacious surface of the kind would be damaged by a strong wind, whereas each division becomes a separate window of no greater width than a single small one: consequently the number of the mullions depends upon the width of the window. Two-mullioned and three-mullioned windows are the most usual in ecclesiastical architecture, except for the large east or west windows in churches, or windows of nearly equal dimensions in other buildings. In these they are frequently very numerous; that, for instance, in the façade of York Cathedral is divided into eight lights or compartments by seven mullions, while that above the entrance to Westminster Hall has eight mullions. Again the former of these is *untransomed*, but the other is *transomed*, being divided in its height to the spring of the arch into two tiers of arch-headed compartments; it also affords an instance of what is by no means uncommon, namely, of principal and subordinate mullions, being divided by two larger mullions into three leading compartments, each of which contains three smaller ones. The lesser or simple mullions, sometimes described as those of the *first order*, consist of the mouldings which run into and form the cusps, where the heads of the compartments are foiled; while the larger ones have additional mouldings. In explanation of this we may refer to the window from Kirton Church, at page 324, GOTHIC ARCHITECTURE, where the centre mullion is larger and composed of more mouldings than the other two, which have only those that form the cusps. As far as they go, the other specimens of windows given in that article will further exemplify the subject of mullions, and serve to render it evident that unless windows were so divided it would be impossible that their heads should be filled up with tracery.

After what has been said, it is hardly necessary to insist upon the importance of mullions, without which a window ceases to be a Gothic one, though it may be a Gothic arch filled with glass. Neither is it sufficient that there be mul-

lions, if they have not the character suitable to the style. Modern architects are apt to be too negligent in this respect, and to make their mullions too poor and meagre, a defect for which no merit in other parts can atone, since the whole will have an air of dryness and insipidity, and there will be little, if any, of that relief and vigour which antient examples possess: the spirit of the style is lost. There is indeed no express rule for determining their proportions, yet no one who knows anything of the style, or has feeling for it, can be at a loss. The breadth of the mullions should never be less than one-fourth of the width of the *intermullions* or lights between them; and in many examples they are more than one-third. It is also important that they should have projection or depth as well as breadth, that is, the glazed surface of the window should recede considerably from the line of the outer face of the mullion. Unless this be attended to, there will be more or less a deficiency of that spirit, boldness, and richness depending upon such particulars of execution, let the outline of a design for a window be ever so good. When, as is now frequently the case in modern churches, the windows are glazed with ground glass, a greater rather than a less degree of boldness in the mullions is requisite, in order to produce that relief which the semi-opake surface of the glass tends to diminish. It is the neglect of such apparently trifling matters that causes the prodigious difference between modern imitations and the originals, which almost every one feels, though few can explain.

Subjoined are the horizontal sections or plans of two mullions; one of the simpler and usual form, the other of a richer character, and with more mouldings; but both of them, as is invariably the case, agree in coming nearly to a point externally, presenting there merely a narrow face or fillet. Each mullion exhibits also some variation of the same general form, in its darker and lighter tinted sides. The cut further instances the spacing of the mullions, which are here not quite three times their own width apart. It will be seen that the *depth* of mullions, or their thickness through their external and internal face, is greater than their *width*. In the second of the two here shown, the depth is double the width.



The letters *g g* indicate the line of the glazing of the window; and S S, the sill.

MULTINOMIAL. [POLYNOMIAL.]

MULTIPLE, SUBMULTIPLE, MULTIPLICATION. Any number of *equal* magnitudes added together give a multiple of any one among them. Thus 4 + 4 + 4, or 12, is a multiple of 4. And submultiple is the inverse term to multiple: thus 12 being a multiple of 4, 4 is a *sub*multiple of 12. The term submultiple is equivalent to ALIQUOT PART.

The derivation of the word is from multi-plex, mani-fold, and multiplication is the process of forming a multiple. Thus to multiply 184 yards by 279 is to repeat 184 yards 279 times, and to add all the results together. And this is the first and fundamental meaning of multiplication. Its usual symbol is ×: thus 4 × 3 is 12.

If we look at the primary rules of arithmetic, we shall see that multiplication is the only one which cannot be entirely performed upon concrete quantities. To or from 100 yards 50 yards can be added or subtracted, and 100 yards can be divided by 50 yards; but 100 yards cannot be multiplied by 50 yards. The very definition of multiplication requires that every question should contain a number of *times* which another number, abstract or concrete, is to be repeated; and this number of times or repetitions cannot be a number of anything else. Thus to talk of multiplying 10 feet by 7 feet is a contradiction in terms; if it mean that 10 feet is to be multiplied by 7, or that 7 repetitions of 10 feet are to be made, 10 feet is multiplied *seven* times, not *seven feet* times. But if it be meant that 10 feet is to be repeated as often as 7 feet contains *one* foot, the question has three data, and belongs to a class which will be considered in PROPORTION: it is in fact a question of multiplication in which the number of repetitions is not given, but is to be extracted from the result of a question in division. On this subject see also RECTANGLE.

It being now distinctly understood that a number of times or repetitions is an essential element of every question of multiplication, the extension is obvious by which a fraction of a time, or a fraction of a repetition, is allowed to enter. Thus 12 + 12 + 12 + 6 is 12 repeated three times and half a time, or 12 multiplied by 3½ is 42. Similarly 2½ + 2½ + 2½ + 1¼, or 8¾, is 2½ taken 3½ times. Up to this point there is no violation of etymology; the *multiplicand* (*multiplicandum*, number to be multiplied) is taken manifold times. But [NUMBER] by the same sort of extension of language by which 1, and even 0, are called numbers, the mere exhibition of a multiplicand is called multiplying it by one: thus 7 is 7 taken once, or 7 multiplied by 1, though, etymologically, multiplication does not take place. Again, when the half of a number is taken, or when it is taken half a time, it is said to be multiplied by ½; and so on for any other fraction. The advantage of such extension in practice more than counterbalances its obvious defect, namely, that the beginner must, without great care, be confused by the application of a word in a sense diametrically opposed to its literal meaning.

The abbreviated process of multiplication rests upon the following principles. (1.) If the parts of a number be multiplied, and the results added together, the whole is multiplied: thus 18, composed of 13 and 5, is taken 7 times by taking 13 and 5 each 7 times, and adding the results. (2.) Multiplication by the parts of any number, and addition of the results, is equivalent to multiplication by the whole: thus 13 taken 7 times and 8 times gives two products, the sum of which is 13 taken 7 + 8 or 15 times. (3.) Successive multiplication by two numbers is equivalent to one multiplication by the product of these two numbers: thus 7 taken 3 times, and the result taken 4 times, is 7 taken as many times as there are units in 4 times 3, or 12 times. (4.) If one number be multiplied by another, the result is the same if the multiplicand and multiplier be changed: thus 7 times 8 is the same thing as 8 times 7. (5.) In the decimal system, the annexing of one cipher multiplies by 10, of two ciphers by 100, &c.

The application of these principles requires that, in the decimal system of notation, the products of all simple digits up to 9 times 9 should be remembered: this is usually done by learning what is called the multiplication table, and this table, which is only absolutely necessary up to 9 times 9, is usually committed to memory up to 12 times 12. This being supposed to be done, we shall now show the process of multiplying 1234 by 5073. By (2.) we must take 1234, 5000 times, 70 times, and 3 times, and add the results. To take 1234, 3 times, we subdivide it into 1000, 200, 30, and 4, each of which taken 3 times, and the results added together, gives

```
3000
 600
  90
  12
————
3702
```

from which process the rule for multiplying by a single figure may easily be derived. The next step is to take 1234, 70 times, that is, first 7 times, and the result 10 times. The full process is

```
 7000
 1400
  210
   28
—————
86380
```

Similarly 1234 taken 5000 times, gives 6,170,000. Now put the three results together, and add them; which gives the first column following.

```
   3702        1234
  86380        5073
6170000        ————
———————        3702
6260082       8638
             6170
            ———————
            6260082
```

The second column shows the usual manner of performing the operation, which we suppose the reader to know. We have given the preceding detail that he may do what many have never done, viz. compare the common process with the deduction of the result from first principles.

There are several abbreviations of multiplication which are very valuable, but which are not commonly taught.

1. Five times is half of ten times: to multiply by 5 annex a cipher and divide by 2: thus 76783×5 is most easily done as follows

```
2 ) 767830
    ------
    383915
```

2. Nine times is one less than ten times, so that 76783×9 can be found as follows:

```
767830
 76783
------
691047
```

This may be best done by subtracting every figure of the multiplicand from the preceding, carrying and borrowing where necessary, in the usual way, on the supposition that the first figure is to be subtracted from ten. Thus the process of multiplying 27293 by 9 is as follows:

```
 27293
245637
```

3 from 10, 7, carry 1; 1 and 9 is 10, 10 from 13, 3, carry 1; 1 and 2 is 3, 3 from 9, 6; 7 from 12, 5, carry 1; 1 and 2 is 3, 3 from 7, 4; 0 from 2, 2.

3. Eleven times is one more than ten times; so that the addition corresponding to the preceding subtraction must be made. Thus to multiply 62781 by 11, proceed as follows:

```
 62781
690591
```

Let 1 remain; 1 and 8 is 9; 8 and 7 is 15, carry 1; 1 and 7 is 8 and 2 are 10, carry 1; 1 and 2 is 3 and 6 are 9; 6 and 0 is 6.

4. To multiply by any number from 12 to 19 inclusive, multiply by the last figure, and to the carrying figure add the figure of the multiplicand which is just done with. Thus

```
 2734
   17
-----
46478
```

7 times 4 is 28, carry 2, adding 4, or carry 6; 7×3 is 21, and 6 is 27, carry $(2 + 3$ or$)$ 5; 7×7 is 49 and 5 is 54, carry $(5 + 7$ or$)$ 12; 7×2 is 14 and 12 is 26, carry $(2 + 2$ or$)$ 4.

5. To multiply by 25, annex two ciphers and divide by 4: to multiply by 125 annex three ciphers and divide by 8.

6. In multiplying by a number of two figures, ending with 7 or 8, as 68, it may be advisable to take the multiplicand 70 times, and subtract it twice, in preference to taking it 60 times, and adding it 8 times.

The following rules are taken from the 'Risala Hisab.' (Taylor's *Liliwati*, Introduction, p. 17.) The first at least can easily be done without paper.

1. To multiply two numbers together, each of which is between 11 and 19: to the whole of one number add the units of the other; ten times this, together with the product of the units' places, is the product required. Thus, 17 times 14 is 21 times 10 and 28, or 238.

2. To multiply two numbers together, each of which has only two places: to the whole of one factor, multiplied by the tens of the other, add the tens of that factor multiplied by the units of the other; ten times the result, together with the product of the units, is the product required. Thus 76×38 is done as follows: 76×3 is 228, which, increased by 7×8, or 56, is 284, and 2840 increased by 48 is 2888, the answer required.

The multiplication of sums of money is facilitated by a process known by the name of PRACTICE.

The multiplication of fractions offers no difficulty when the extension of the word multiplication, already described, is understood and admitted. For instance, when we have to multiply $\frac{2}{3}$ by $\frac{4}{11}$, or to take $\frac{2}{3}$ 4-elevenths of a time, we see that $\frac{2}{3}$ being $\frac{22}{33}$ [FRACTIONS], one-eleventh of this is $\frac{2}{33}$, and 4-elevenths is $\frac{8}{33}$: whence the rule commonly given, namely, multiply the numerators together for a numerator, and the denominators for a denominator. In the multiplication of one decimal fraction by another, as 1·23 by ·018, the multiplication of the numerators gives 123×18, or 2214, and that of the denominators 100×1000, or 100,000. But a decimal fraction which has 100,000 for its denominator, has as many places as there are in both of the others together, whose denominators are 100 and 1000. From this consideration the common rule immediately follows.

For a mechanical contrivance for expediting multiplication, see NAPIER'S RODS.

MULTIPLE POINTS. When two or more branches of a curve pass through the same point, it is called a multiple point; and this, whether the branches touch or cut one another. When two or more branches intersect, it is obvious that as many distinct tangents may be drawn at the multiple point as there are branches which there intersect, that is, for one value of the abscissa the differential coefficient of the ordinate may have more values than one. In most cases the points at which this happens may be ascertained by inspection of the equation of the curve. Thus in

$$y = (x - b)\sqrt{(x - a)} + c \quad b < a$$

$$\frac{dy}{dx} = \sqrt{(x - a)} + \frac{x - b}{2\sqrt{(x - a)}}$$

we see that y, in general, has two values, and so has $\frac{dy}{dx}$: to each value of the former belongs one of the latter. But in the single case of $x = b$, both values of y become equal, or y has only one value; while $\frac{dy}{dx}$ has the two values $+\sqrt{(b - a)}$ and $-\sqrt{(b - a)}$. There is then a multiple point when $x = b$ and $y = c$; and as two branches cut one another, it is called a *double* point. Similarly, had there been three, four, &c. branches, it would have been called a triple, quadruple, &c. point.

It is not worth while to enter here on the general method of determining double, &c. points. (See *Lib. Usef. Kn.*, 'Differential Calculus,' p. 182.)

MULTIPLICATION. [MULTIPLE, &c.]

MULTIVALVES, the name formerly used to designate those shells which were made up of more than two pieces. Thus the *Cirrhipeds* (*Lepas*) were all multivalve shells of Linnæus, and so were *Chiton* and *Pholas*.

MULWIA. [MAROCCO.]

MU'MMIUS, L. [CORINTH.]

MUMMY is a name derived from an Arabic word *mum*, signifying wax, and which is now applied not only to those dead bodies of men and animals, in the preparation of which wax or some similar material was used, but to all those which are by any means preserved in a dry state from the process of putrefaction.

The art of embalming, by which the greater part of the mummies now existing were prepared, was practised, with more skill than has ever since been acquired, by the inhabitants of ancient Egypt, of whom whole generations still remain preserved from decay in the vast hypogæa or catacombs in the neighbourhood of Thebes and the other great cities of that country.

The most authentic description of the Egyptian method of embalming is that given by Herodotus (ii. 86). In Egypt, he tells us, 'there are men who professedly exercise this art. When a corpse is brought to them, they show the bearers of it wooden models of bodies, painted in imitation of reality. They say that the most expensive of them is His, whose name I will not in such a case mention. They exhibit also a second model, inferior to the first, and cheaper than it; and a third, the cheapest of all. After this explanation, they ask the bearers of the dead body, after which model they wish it to be prepared, and they, having agreed upon the price, depart. The embalmers proceed for the most expensive plan in the following manner. First, with a curved iron they extract the brain through the nostrils, partly by pulling it out, and partly by pouring drugs in. Then with a sharp Æthiopian stone they cut the body in the flank, and through this aperture they take out all the viscera, which they wash with palm wine, and clean with powdered aromatics. They then fill the belly with the purest powdered myrrh and cassia, and other perfumes (frankincense excepted), and sew up the wound. In the next place they cover the body with natrum (a mixture of

carbonate, sulphate, and muriate of soda), and bury it in the same material for seventy days, a longer period not being allowed. When the seventy days are passed, they wash the body and envelop it all in bandages of fine linen covered with gum. The relatives, on receiving the body again, have a wooden case made in the form of a man, in which they place it, and having shut it in, they put it in a sepulchral building, setting it upright against the wall.

'Those who would avoid the heavy expense of this method of embalming, have the bodies thus prepared:—they fill all the intestines with cedar oil, without either cutting into the abdomen or removing the viscera; then preventing the egress of the injected fluid, they salt the body for the fixed number of days, and at the end of that time they let out the cedar oil, the power of which is such that it brings out macerated in it both the intestines and all the viscera; it consumes the flesh, and the skin and the bones only of the corpse remain. This being done, they return the body. The third mode of preparation is that with which the bodies of the poor are treated. They wash out the abdomen with a cleansing liquid, put it for seventy days in natrum, and then return it to the relatives.'

To this account Diodorus Siculus (*Biblioth. Histor.*, lib. i., cap. 91) and some others, while generally confirming it, add a few unimportant particulars; and though it has been subjected to severe criticism from various commentators, yet the researches of those whose authority is next in importance, the members of the Institute who accompanied Napoleon in his Egyptian campaign, have proved that as far as it goes this description by Herodotus is substantially correct. The results of these researches, in which MM. Jomard, Rouyer, and Larrey were chiefly engaged, are contained in the great work, 'Description de l'Egypte.' Those of M. Rouyer especially illustrate the process of embalming. He found that in the hypogæa which he visited there were two different classes of mummies; those in which an incision had been made above the groin, and those in which there was no such opening. In both the brain had in general been extracted by breaking through the roof of the nose, or more rarely through the orbit; but in some there was no unusual aperture in the skull, and the brain had been left in it, a fact which is confirmed by the examination of some of the mummies that have been brought to England. (Pettigrew, *History of Egyptian Mummies.*)

Among the mummies which have an incision in the flank (and which are probably the bodies of the rich, in whom that measure was necessary for the complete cleansing of the interior), M. Rouyer distinguishes those which were dried with the assistance of balsamic and astringent substances, and those which, in addition to these means, were salted.

Of both these kinds some are filled with a mixture of aromatic resins, and others with asphaltum or pure bitumen. The mummies which are filled with aromatics only are olive-coloured. Their skin is dry, flexible, and like tanned leather, and contracted. Their features are distinct, and appear to be like those that existed in life. The resins which all their cavities contain are dry, light, brittle, and aromatic. The teeth, hair, and eye-brows are generally perfect. Some of them are gilded all over the body, or on the most prominent parts.

The mummies which are filled with bitumen are reddish; their skins are hard and polished as if they had been varnished; they are dry, heavy, inodorous, and difficult to unrol; their features are but slightly altered; the hard black resinous substance with which they are filled possesses little odour, and they are scarcely alterable by exposure to the air.

Those which have been salted, as well as thus prepared, differ little in their general appearance from those just described; but they are usually less perfect, the features being altered, and their hair having commonly fallen off. When they are uncovered and exposed to the air, a slight saline efflorescence forms upon them, which consists of different salts of soda. The intestines and other viscera, which in all these kinds of mummies were removed through the aperture in the flank, after being washed with palm wine and sprinkled with aromatics, were usually placed in an earthen vessel, and then, with prayer for the pardon of the sins in eating and drinking into which they had led their possessor, were thrown into the river; but sometimes, after being thus cleansed, they were returned into the abdomen, or were preserved in a separate vase by the side of the body. The edges of the incision in the flank are always found placed in simple contact, not sewn together as Herodotus mentions.

Among the Egyptian mummies which have not had the viscera removed by opening the abdomen, M. Rouyer also distinguishes two kinds; in one of which the bodies had been salted, and then filled with an impure kind of bitumen (pissasphalt), while in the other they had only been salted and dried. M. Rouyer thinks that instead of the viscera being destroyed, as Herodotus mentions, by oil of cedar, which has no caustic properties, some caustic solution of soda was first injected, and that afterwards, when it had destroyed the viscera, the cavities were washed out with the oil of cedar. The mummies which, after having had their viscera thus removed, were filled with bitumen, are the most numerous of all; they are black, hard, and heavy, and they preserve none of their features. Not only are all the cavities filled with the pissasphalt, but the surface of the body is covered with it, and it has so completely penetrated into all the tissues, that the whole forms but a single mass. It is probable therefore that this material was injected very hot, and that the bodies were plunged into a vessel containing it in a state of fusion. It is an impure, greasy, and strongly smelling substance, less black and brittle than the asphalt with which the other mummies are filled; it was long regarded as a valuable medicine for wounds and bruises, and in the sixteenth and part of the seventeenth centuries a considerable trade was carried on in it by a number of Jews, who sold it as 'balm of mummies.'

Those mummies which have been only salted and dried are even less perfect than the preceding. Their features are entirely destroyed; all their hair is fallen off; and both the body and the bandages by which it is enveloped fall in pieces when brought to the air, or may very easily be broken up. In many of these adipocire is formed; but in general they are hard, dry, and whitish, like dirty parchment.

The bandaging, to which all the Egyptian mummies were subjected, was one of the most remarkable parts of the process. Their envelopes are composed of numerous linen bands, each several feet long, applied one over the other fifteen or twenty times, and surrounding first each limb, and then the whole body. They are applied and interlaced so accurately, that one might suppose they were intended to restore to the dry shrivelled body its original form and size. The only difference in the bandages of the different kinds of mummies is in their greater or less fineness of texture; they are applied on all in nearly the same manner. All the bandages and wrappings which have been examined with the microscope are of linen.

The body is first covered by a narrow dress, laced at the back and tied at the throat, or it is all enveloped in one large bandage. The head is covered by a square piece of very fine linen, of which the centre forms a kind of mask over the features. Five or six such pieces are sometimes put one over the other, and the last is usually painted or gilded in representation of the embalmed person. Every part of the body is then separately enveloped with several bandages impregnated with resin. The legs extended side by side, and the arms crossed over the chest, are fixed by other bandages which surround the whole body; and these last, which are commonly covered with hieroglyphics, are fixed by long, crossing, and very ingeniously applied bands which complete the envelope. Most of the bodies are placed in this state in the catacombs; those of the rich only are enclosed in cases. The cases are usually double, the interior being composed of boards made of several portions of linen glued together, and the exterior cut from a piece of cedar or sycamore wood.

The Egyptians practised embalming almost as extensively on some animals which they deemed sacred as on men. The list of the mummies of animals which Mr. Pettigrew gives includes the monkey, bat, dog, cat, lion, wolf, jackal, fox, hyæna, bear, ichneumon, shrew-mouse, deer, goat, sheep, oxen and calves, hippopotamus, vulture, eagle, falcon, hawk, owl, ibis, goose, swallow, crocodile, toad, lizard, snake, adder, cerastes, carp, pike, and some other fish, and a few species of insects. Some vegetables also have been occasionally found embalmed. Most of these animals had sepulchres appropriated to their species, but sometimes they are mixed, and very rarely they are found in the catacombs of human mummies. The most frequent mode of preparation was by clearing out the viscera by the caustic fluid, and salting them, and then bandaging them like the

human bodies. The ibis and the hawk however usually received more care, and were prepared with resin and asphalt. After being embalmed, each bird was usually placed in a separate earthen vessel.

The Egyptian mode of embalming was imitated occasionally by the Jews, Greeks, Romans, and other nations, and has sometimes been adopted in modern times, but never to the same extent or perfection as they attained. The only other method which is known to have been adopted as a national custom was that practised by the Guanches, the antient inhabitants of the Canary Isles. [CANARY ISLES.] Their mummies are particularly described by M. Bory de St. Vincent, in his 'Essai sur les Isles Fortunées.' Numerous and vast catacombs are filled with them in each of the thirteen islands, but the best known is one in Teneriffe, which contained upwards of a thousand bodies. The mummies are sewn up in goat or sheep skins, and five or six are commonly joined together, the skin over the head of one being stitched to that over the feet of another; but those of the great are contained in cases hollowed out of a piece of savine-wood. The bodies are not bandaged, and are dry, light, tan-coloured, and slightly aromatic. Several of them are completely preserved, with distinct though contracted features.

The method of embalming adopted by the Guanches consisted in removing the viscera, in either of the same ways as the Egyptians practised, then filling the cavities with aromatic powders, frequently washing and anointing the surface, and lastly drying the body very carefully for fifteen or sixteen days in the sun, or by a stove. So complete is the dessication of these mummies, that a whole body which Blumenbach possessed weighed only 7½ pounds, though the dried skeleton of a body of the same size as usually prepared weighs at least 9 pounds.

In some situations the conditions of the soil and atmosphere, by the rapidity with which they permit the drying of the animal tissues to be effected, are alone sufficient for the preservation of the body in the form of a mummy. This is the case in some parts of Peru, especially at Arica, where considerable numbers of bodies have been found quite dry, in pits dug in a saline dry soil. There is an excellent specimen of a mummy of this kind in the museum of the College of Surgeons, which was brought from Caxamarca by General Paroissien. Like most of them, it is in a sitting posture, with the knees almost touching the chin, and the hands by the sides of the face. It is quite dry and hard; the features are distorted, but nearly perfect, and the hair has fallen off. The Peruvian mummies do not appear to have been subjected to any particular preparation, the dry and absorbent earth in which they are placed being sufficient to prevent them from putrefying. M. Humboldt found the bodies of many Spaniards and Peruvians lying on former fields of battle, dried and preserved in the open air. In the deserts of Africa the preservation of the body is secured by burying it in the hot sand; and even in Europe soils are sometimes met with in which the bodies undergo a slow process of drying, and then remain almost unalterable even on exposure to the air and moisture. There is a vault at Toulouse in which a vast number of bodies that had been buried were found, after many years, dry, and without a trace of the effects of putrefaction; and in the vaults of St. Michael's church, Dublin, the bodies are similarly preserved. In both cases putrefaction is prevented by the constant absorption of the moisture from the atmosphere, and through its medium from the body, by the calcareous soil in which the vaults are dug.

It is not necessary here to consider the various means which are now employed for the preservation of the animal tissues, both for stores of food and for museums of anatomy and natural history, as they are very rarely applied to the whole body, and are deficient in that which forms the most essential part of the preparation of a mummy, the process of drying. If European climates were more favourable, it is probable that, with the present knowledge of materials for hardening the tissues, such as pyroligneous acid, corrosive sublimate, arsenic, the salts of iron, &c., mummies might be prepared equal even to the Egyptian in permanence, and superior to them in the preservation of their forms. (Pettigrew, *Hist. of Egypt*, 'Mummies;' *Library of Entertaining Knowledge—Egyptian Antiquities.*)

MUMPS, an inflammation of the parotid, and often, at the same time, of the other salivary glands, of contagious or epidemic origin. The inflammation, and the fever by which it is accompanied, generally increase for about four days, and then begin to subside; and after four days more, the disease is commonly at an end. The affection has a tendency to metastasis, that is, to pass suddenly from the organ first affected to some other. The treatment required is very simple; quietude, abstinence, seclusion from cold, the application of poultices or other warm substances, or, in severe cases, of leeches to the swelling, are all the means that are usually necessary.

MÜNCHHAUSEN, ADOLPHUS, BARON, born in Hanover in 1688, studied at Jena, Halle, and Utrecht, and afterwards filled several important official stations in the electorate. He was an active agent in founding the university of Göttingen, of which he was appointed curator, which situation he held till his death. He devoted himself with great assiduity and zeal to the advancement of that institution, which rose under his care to a high rank among the universities of Germany. He established the chairs of geography, literary history, and political science, and improved the system of teaching philosophy and theology, by doing away with the old scholastic methods. Heyne says that Münchhausen introduced into the university freedom of thinking, feeling, and writing. He promoted the establishment of the Royal Society of Sciences of Göttingen. He increased the library of the university from 10,000 to 60,000 volumes, which number afterwards, whilst Heyne was librarian, was brought up to 200,000. All these things Münchhausen did with very moderate means, and chiefly by his activity, judgment, and perseverance. More ample particulars of what Münchhausen effected for the benefit of the university of Göttingen are given in the 'Quarterly Journal of Education,' No. XX.; in Heyne's 'Oratio in Honorem ac Memoriam Münchhausianam,' inserted in the 2nd volume of his 'Opuscula Academica,' and in his other oration on the same subject delivered before the Royal Society of Sciences of Göttingen, inserted in the second volume of 'Novi Commentarii Societatis Gottingensis;' and also in Heeren's 'Life of Heyne.'

Münchhausen was for many years privy-counsellor to the elector of Hanover, George II. of Great Britain, and in the latter years of his life was appointed first minister, by his successor, for the electorate of Hanover, which situation he filled to the general satisfaction, though only for a short time. He died at Hanover, in 1770.

MUNDA. [CÆSAR, C. J., p. 124.]

MUNDLEYSIR. [HINDUSTAN, vol. xii., p. 211.]

MUNEEPOOR, a country in Asia, east of the British possessions on the Ganges, extends between 23° 45′ and 25° 30′ N. lat. and 93° and 94° 30′ E. long. Its northern boundary-line is ill defined, but is generally assumed to be formed by the high range of mountains which, extending in a north-east and south-west direction, constitute the southern border of the valley of the Brahmapootra. From the British possessions on the west it is divided by the course of the river Barak between the mouths of its two tributaries, the Chikoo, which runs into the Barak from the south, and the Iecree, which joins it from the north, and by the course of these two last-mentioned rivers. Along its southern boundary extends a mountain-region inhabited by several independent tribes belonging to the Nagas or Kookees. On the east it is divided from the valley of Kubo and other districts annexed to the Birman empire, by a chain of mountains called the Muring range. According to the estimate of Captain Pemberton, the known portion of Muneepoor occupies an area of 10,000 square miles, of which a valley, or rather plain, containing 650 square miles, constitutes the central portion. This plain is encircled on all sides by a zone of hilly and mountainous country, inhabited by various tribes, subject to Muneepoor.

The valley, which constitutes by far the most valuable portion of the kingdom, is 2500 feet above the sea. Its extreme length is about 36 miles, and its average breadth about 18. In its whole extent it is covered with a deep alluvium of great fertility, and consists of two gently inclined plains, meeting in the middle on the banks of the Imphan Toorel river. Numerous small detached groups of hills appear in various parts of the valley, above which they rise from 500 to 600 feet; and to the east of the antient town of Muneepoor is a range, whose central peak, called Nongmueeching, is 2700 feet above the valley, and 5200 feet above the sea. The valley itself is perfectly free from forests, but every village is surrounded by a grove of fruit-trees. Nearly the whole of the central portion consists of a series

of *jheels* and marshes, which retain water all the year round, and furnish extensive pasture-ground for cattle and horses. The villages are built either upon the edges of the slopes connecting the bases of the mountains with the valley, or on the banks of the Imphan Toorel, which are generally higher than the country behind them.

The range of mountains which forms the western barrier of the valley is more elevated and extensive than any other between Silhet in Bengal and the western boundary of the Birman empire; it runs in a direction nearly south-south-west, between 94° and 93° 30′ E. long., for 80 miles, to the extreme southern limits of the Muneepoor valley, where it gradually declines, and at length terminates in a series of broken and rugged heights. It slopes gradually into the valley by a succession of lower hills. But on the western side this range, which has not yet received a general name, throws off numerous precipitous ridges, whose upper portions are too steep to admit cultivation, which is consequently limited to the lowest part of their declivities. On this side it is an almost unbroken mass of magnificent primeval forest and luxuriant vegetation, whilst the eastern face of the range, which fronts the valley, has been almost entirely cleared, and is annually cultivated with rice and cotton by the Nagas. The elevation of the principal range varies from 5790 to 8200 feet above the sea.

The Muring range, which bounds the valley on the east, is less extensive and elevated. Its extreme length is about 50 miles, and its eastern declivity is the more precipitous. It is united with the valley by a gentle slope. Its elevation varies between 4900 and 6730 feet above the sea. This range lies within the limits of Muneepoor, but the valleys beyond it belong mostly to the Birman empire; the most important and extensive is that of Kubo.

On the north and south the valley is not enclosed by a continuous range, but by the projecting ends of numerous ridges, which issue from two extensive mountain-tracts which lie in that direction; the northern has been explored very imperfectly and the southern not at all by Europeans. The northern is immediately connected with the mountains which constitute the southern boundary of the valley of Asam, and the southern seems to constitute the most north-eastern extremity of the Yeomadong range or Aracan mountains, which, separating Aracan from Birma, terminate with Cape Negrais (16° N. lat.). The ridges projecting from both mountain-regions stretch into the valley, and are separated by narrow defiles, through which a small stream generally flows.

The principal river of the vale of Muneepoor is the Imphan Toorel, which rises with two principal branches in the mountain-region lying north of the vale; the eastern is called the Eeril, and the western the Khongba river. The latter, which is the principal branch, unites with the Eeril two miles south of Langthabal, near 24° 40′ N. lat. Ten miles lower down, it is joined by the Thobal river, which likewise descends in a southern direction from the northern mountain-region. The Imphan Toorel traverses the centre of the vale in a southern direction, and enters the southern mountain-region at the village of Shoogoonoo, near 24° 15′ N. lat. Its course in this region is not known, but it is said to form a tremendous fall, which is very probable, as the difference of level between the vale of Muneepoor and the low lands of Kulé amounts to more than 1500 feet. This difference of level must be overcome either by a rapid succession of numerous falls or by one or two of stupendous magnitude. After leaving the mountain-region at 22° 35′ N. lat., it enters the plain of Kulé, belonging to Birma, where it is called Nankathé Khyoung, and after receiving the united waters of the Myettha and Man rivers, which flow from the south, it suddenly turns north by a bold bend and flows in that direction for about 35 miles, when it bends east, and traversing the Ungoching hills, enters the Ningtha or Kuenduen river, the great tributary of the Irawaddi. The whole course of the Imphan Toorel is upward of 300 miles, but, except during the rainy season, it is only navigable for small skiffs formed of a single tree, which are the only description of boats used in Muneepoor. During the floods it flows with a velocity of five or six miles an hour, and has a depth of 20 to 30 feet, owing to its contracted channel; but if the season is more than usually wet, the waters rush over the banks, and convert all the central portions of the vale into a vast swamp.

At about 24° 30′ N. lat. the Imphan Toorel is joined by the Koretuh river, or the outlet of the lake Logta, which is about four miles long and two wide, and occupies the south-western corner of the vale. It is formed by numerous small streams descending from the western mountain-range. Near its southern extremity are three ranges of small islands; the central range, called Tangak-hoolet, is 470 feet above the level of the lake. These islands are principally inhabited by fishermen, and are particularly well adapted to the culture of fruit-trees. The lake furnishes twenty-six varieties of fish, eighteen common to the rivers of Bengal, and eight not found in any of them.

The mountainous district of Muneepoor, which lies to the west of the vale, and separates it from Cashar, is traversed by the Barak or Soormah river, an affluent of the Brahmapootra, or Megna, into which it falls near the village of Sunerampoor in Bengal. The sources of this river are about 25° 30′ N. lat. and 94° 20′ E. long., in the mountain-region which lies between Muneepoor and Asam. It runs through Muneepoor in a south-south-western direction, and forms at the most south-western corner of the country a bend, by which its course is changed into a northern one. It flows north for about 50 miles, and here forms the boundary-line between Muneepoor and Cashar up to the mouth of the Jeeree river. Its course through Muneepoor is upwards of 180 miles; but it is too rapid for navigation. It is only at the mouth of the Jeeree river that it becomes navigable for boats of any burthen.

The climate of the vale of Muneepoor is modified by its elevation above the sea and the mountains which surround it. In December and January the thermometer at noon varies between 56° and 58°, and hoar-frost occurs frequently during the night. In November and February the thermometer is at noon between 60° and 68°, and in June it generally attains from 80° to 85°. The difference between the temperature of Muneepoor and Calcutta in winter (December, January, and February) is from 11 to 18 degrees; but in summer (June, July, and August) it varies only between 6 and 8 degrees. The quantity of rain is much less at Muneepoor than at Calcutta, though the number of rainy days is greater. At Calcutta there are only 72 rainy days in the year, while in Muneepoor they amount to 115; but at Calcutta 55·39, and at Muneepoor only 48·33 inches of rain fall. On the slopes of the mountains surrounding the vale the showers are more frequent than in the level country; but the cold months, from November to February, are almost entirely exempt from rain. In March the showers become very frequent, and in the month of April the rains are sometimes more abundant than in other parts of the year. In May the rivers begin to rise, and continue to do so until the middle of October, when they again fall with remarkable rapidity. During the cold months, until ten or eleven o'clock in the morning, the valley is enveloped in a dense fog, which, on dissipating, leaves a beautifully clear and cloudless atmosphere; but an hour after sunset the vapours become again condensed, and are precipitated as dew, which, during the night, is converted into hoar-frost. The climate of Muneepoor is peculiarly favourable to the constitutions both of Europeans and the natives of Hindustan.

The agricultural produce of Muneepoor consists principally of rice, which forms the staple article of food, and the crops are everywhere very abundant, as the numerous streams which issue from the mountains surrounding the vale ensure an adequate irrigation even to the fields which are above the level of the general inundation. Tobacco, sugar-cane, indigo, mustard, and different kinds of sesamum and opium, are also cultivated, and cotton in the valleys of the mountainous districts. In the gardens which surround each house vegetables are extensively cultivated; and since the termination of the Burmese war, English officers have introduced the vegetables of Europe, such as peas, potatoes, different varieties of greens and cabbages, carrots, radishes, beet-root and turnips; the two first have proved so acceptable to the people, that they now are almost universally cultivated. Fruits do not generally attain great perfection, except pineapples, which are not inferior to any on the face of the globe, and the oranges grown on the islands of lake Logta. The other fruits are apples, apricots, raspberries, strawberries, limes, pomegranates, guavas, mangoes, and jack-fruit; but they are not distinguished by flavour, owing to want of care and skill in their cultivation. Silk is collected in considerable quantities in some villages on the northern borders of the vale.

In no part of India do the forests afford a greater variety

of excellent trees than those which cover the mountains surrounding the vale of Muneepoor. Cedar of gigantic size, fir, and pine, occupy the highest portions of the ranges; oak of every size occurs on the several hills and mountains, and is employed as fuel and building materials. Many other forest-trees, commonly found in countries in the latitude of Muneepoor, are abundant. The teak-tree however, and the keo, from which the celebrated Burmese varnish is obtained, are only met with on the south-eastern ranges bordering on the vale of Kubo. But all this wealth is of little use in a commercial point of view, as the nature of the country precludes the possibility of transporting the timber to foreign markets with any prospect of advantage.

The animals employed in agriculture are buffaloes and cattle, more especially the former. The cattle are much superior to those of Bengal. The horses are of a diminutive size, rarely attaining a height exceeding thirteen hands; but they are hardy, vigorous, and highly valued. Goats and sheep are only reared on the slopes of the mountains; the latter were lately introduced by British officers. Elephants are frequently seen in the glens and defiles on the north of the vale; deer are abundant, and grow to a very considerable size. The wild hog is not less common, but the tigers have retired to the fastnesses of the hills, as cultivation has extended in the vale. A wild dog is found among the hills, where it hunts in packs. Fowls, ducks, geese, and pigeons are sufficiently numerous.

Gold is not found in Muneepoor, though it occurs in the Kyen-duen, and in the rivers which fall into it; but iron is common in several parts, especially in the beds of small rivers south of Thobal and in the hills near Langthabal. This metal is worked and manufactured into axes, hoes and plough-shares, spears, arrow-heads, and blades for daggers. No other metal seems to occur; but several rich salt-springs are found on the eastern side of the vale, not far from the foot of the hills. The quantity of salt manufactured from them is not only sufficient for the consumption of the vale, but is also used as an article of traffic with the surrounding tribes, who barter for it their tobacco, ginger, cloth, and cotton.

The Muneepoorees, or inhabitants of the vale, appear to be the descendants of a Mongol colony, which in antient times penetrated into this country: they rather resemble the Chinese and Burmese than the inhabitants of Bengal, being taller, stronger, and possessing a more vigorous mind than the latter. They have made considerable progress in the arts of civilisation. They make several kinds of cotton-cloth and muslins, and their silk fabrics are remarkable for strength and the brilliancy of their colours, especially a kind of large scarfs, which sometimes are very richly embroidered, and then exported to Ava. Capt. Pemberton estimates the whole population at only 20,000 souls, and states that only one-quarter of the cultivable surface is at present employed for agricultural purposes. He ascribes it to the continual inroads of the Burmese before the last war. The language of the Muneepoorees is very different from that of Bengal, but the Bengalee is generally understood. Brahmanism seems to be the prevailing religion.

The mountains which enclose the vale are occupied by different tribes of mountaineers. All the tribes north, west, and east of the vale partake strongly of the characteristic features of the Tartar countenance, and are remarkable for superior height, fairer complexion, and more elevated forehead, when compared with the tribes which occupy the southern borders of Muneepoor. The last-mentioned tribes rarely average more than five feet one or two inches in height, and their colour is nearly as dark as that of the Bengalees of the plain; in features they rather resemble the Malays than the Tartars. The mountainous country between Cashar and the vale of Muneepoor is occupied by the Kupooees, known in Bengal by the name of Nagas: the numerous tribe of the Murams inhabit the high mountain-range between Muneepoor and Asam; and among the other tribes, the Loohooppas, on the north-east of the vale, are the most numerous. All these tribes are cultivators of the soil, and reside in villages. Among the Murams the terrace system of cultivation very generally prevails; but the other tribes only clear the forest and burn the wood, after which they cultivate the ground until it is exhausted. Tobacco, cotton, ginger, and pepper are universally cultivated; and cloth is manufactured of their own cotton, which is highly prized by the inhabitants of the adjoining low countries.

The town of Muneepoor, which is nearly in the centre of the vale, was destroyed in the wars with the Burmese, and has not been rebuilt. The raja of Muneepoor, who, since the peace of Yandaboo (1826), is placed under the protection of the British government in India, resides in the village of Langthabal, near the union of the rivers Khongba and Eeril. There is no place in this country which carries on any commerce, but it will probably become the entrepôt of an extensive trade, as the most easy route by land between Hindustan and China lies across this vale, and the Chinese merchants from Yunnan formerly advanced as far as Muneepoor in their commercial travels. The greatest difficulty which opposes such an extension of trade is the mountainous country between the lowlands of Cashar and the vale. Though three roads traverse this tract, they pass from four to seven mountain-ranges within a space of between 80 and 90 miles, and can only be used during the dry season. The country between Muneepoor and China seems to offer fewer obstacles to the transport of merchandise.

(Pemberton's *Report of the Eastern Frontier of British India*; Ritter's *Erdkunde von Asien*, vol. v.)

MUNICH (in German, *München*), the capital of the kingdom of Bavaria, is situated on the left or west bank of the Isar, in a plain which is bounded on the east by low hills. It is in 48° 8′ 19″ N. lat. and 11° 35′ 15″ E. long. Munich, though it still bears traces of its antiquity, is one of the handsomest towns in Germany. It has several broad straight streets, with lofty houses, in a good style, and some very handsome squares. In the Odeon-square is an obelisk 95 feet high, made of the metal of cannon taken from the enemy, and erected in 1833, in honour of 30,000 Bavarians who fell in the Russian campaign in 1812. The Max-Joseph-square is to be adorned with a colossal bronze statue of King Maximilian, which is now completed, and will probably be set up before this article is printed. Though not a place of strength, Munich is still surrounded with a rampart, and has seven gates leading to the suburbs, viz. St. Anne's (formerly Lehel), Au, Isarvorstadt, Maximilianvorstadt, Ludwigsvorstadt, and Schönfeld; the last three are of modern date, and contain a great number of fine buildings. The largest suburb is the Au, lying beyond the two arms of the Isar, and connected with the old city by two bridges, one of stone, 347 feet in length, and the other of wood, 700 feet long.

The population of Munich and the suburbs was, in 1815, 60,215. In 1824 it amounted to 66,125 without the garrison; but including the garrison, with the 4667 women and children belonging to it, and the village of Haidhausen, with 3475 inhabitants, the total was 74,067. Cannabich (1836) says that, according to the latest census, the total population, including the garrison, was 95,536. The latest account we have seen (1838) gives 95,718, of whom 72,117 were Roman Catholics, 5826 Lutherans, 607 Calvinists, 932 Jews, and 48 of various other sects.

The number of illegitimate children known to be such in Munich is very great, and seems to be increasing, as appears from the following statement:—

Years.	Legit.	Illegit.
1809	1572	653
1814	1958	786
1815	2295	814

Some accounts of the last two or three years state the number of illegitimate births as equal to and even exceeding that of the legitimate; but such statements require to be supported by very good evidence.

Munich has numerous scientific and literary institutions, most of which have been improved or founded by the late king Maximilian Joseph I. and the present king Ludwig; to the latter it is chiefly indebted for the magnificent buildings and inestimable treasures of antient and modern art. The Royal Academy of Sciences was founded in 1759 by the elector Maximilian Joseph III.; in 1807 it received from king Maximilian I. a new constitution and ample endowment, and was reorganised in 1827. A general conservator has under his care the public library of 400,000 volumes and 8500 MSS., the Museum of Natural History, the Brazilian Museum, composed of the collections formed by Dr. Spix and Dr. Martius (whose numerous and splendid works on Brazil and its natural history far surpass anything hitherto published in Germany), the Physical, Mathematical, and Polytechnic collections, the Botanic Garden, the Cabinet of Medals, the Antiquarium or Cabinet of Antiquities, the Chemical Laboratory, the Observa-

tory at Bogenhausen, &c. There are two gymnasia for the higher branches of education, the Royal Academy of Arts, the Military Academy, the Veterinary and Medical-Clinical Schools, the seminary for forming teachers, the Central Polytechnic School, and many others. The university was founded in June, 1472, at Ingolstadt, was transferred in 1800 to Landshut, and in 1827 to Munich. In 1835 it celebrated its 373rd anniversary, on which occasion the new regulations for the studies and discipline were promulgated. There are 58 ordinary and 10 extraordinary professors, and between 1300 and 1400 students. The university is well furnished with all the necessary requisites, and has a library of 105,000 volumes. Besides many private schools, there are 13 elementary schools for boys and 12 for girls of the lower classes, which are attended by above 6000 children; and Sunday-schools, chiefly for servants and work-people. The charitable institutions are numerous, and on a very liberal scale. Such are the general hospital, for 500 patients; St. Joseph's Hospital, for 260 patients; an asylum for the blind, and for the deaf and dumb; the military lazaretto, the poorhouse, the lunatic hospital, the lying-in hospital, and many others. The house of correction is considered as a model of its kind. It contains a manufactory of woollen cloths. In one year the cloth manufactured was worth 100,194 florins, and the gain of the 442 prisoners 36,467 florins (10 florins=1*l.* sterling). The successful exertions of Count Rumford for the suppression of mendicity at Munich are well known. His establishment for preparing and distributing economical soup still subsists.

The manufactures of Munich are of many different kinds, chiefly for the consumption of the city and neighbourhood: the articles made are linen, woollen cloth, calicoes, damask, silk, ribands, household furniture, piano-fortes, playing-cards, articles of gold and silver, coaches, excellent mathematical, surgical, optical, and astronomical instruments. Fraunhofer's (now Utzschneider's) manufactory of astronomical and optical instruments is celebrated throughout Europe. In 1824 it produced the great telescope for the university of Dorpat, which is 160 Paris inches in length and 10 in diameter. There are likewise manufactures of leather, snuff, and paper (the latter, established in 1347, is probably the oldest in Germany), extensive breweries, and distilleries. But all these are on the whole of little importance, and the inhabitants owe their support chiefly to the numerous public establishments, the government offices, the expenditure of the court, and of the numerous landowners who reside in the capital. Lithography was invented at Munich by M. Sennefelder.

The environs of the city are very pleasant, and contain numerous places of public resort and amusement, which are very much frequented. The English garden, as it is called, laid out by the elector Charles Theodore, is a favourite place of resort in summer. The river Isar flows through it, and has a neat bridge over it. In the vicinity are the royal country-seats of Nymphenburg and Schleissheim, both of which contain fine picture-galleries. The inhabitants of Munich are very fond of amusement: in the summer they enjoy the open air in the country; and in the winter, besides the carnival, frequent concerts and balls. There are likewise three theatres. Though Munich is so far south, the climate is by no means mild, in consequence of its elevation of 1585 feet above the level of the Adriatic and the vicinity of the mountains of the Tyrol. The changes of temperature are sudden, and injurious to health.

Within the last twenty years Munich has raised itself to a European celebrity as a seat of the fine arts, for which distinction she is mainly indebted not to the patronage alone, but to the personal enthusiasm of the present sovereign Ludwig I. of Bavaria, in behalf of art. The number of public buildings erected within that comparatively very brief space of time, some of them such as would be deemed ornaments to any of the largest capitals in Europe, is astonishing, when the limited resources of such a small kingdom as Bavaria are taken into the account. Neither is it merely as buildings—as works of architecture alone, that these additions to the capital are worthy monuments of art; for painting and sculpture, fresco, and in some instances polychromy also, have been unsparingly employed to embellish them. The interiors of our British Museum and National Gallery are of quaker-like plainness in comparison with the halls of the Glyptothek and Pinacothek; nor have we anything whatever that can even convey an idea of the frescos of the Hof Arkaden and the Allerheiligen Kapelle, or of the Ionic polychrome temple in what is called the English Garden. It would in fact require not only a volume, but one copiously illustrated with engravings, to describe at all satisfactorily those edifices alone which have been erected and adorned within the brief space above mentioned, or which are still actually in progress. We shall therefore merely give some account of the principal, after first noticing one or two of the more remarkable of the older buildings.

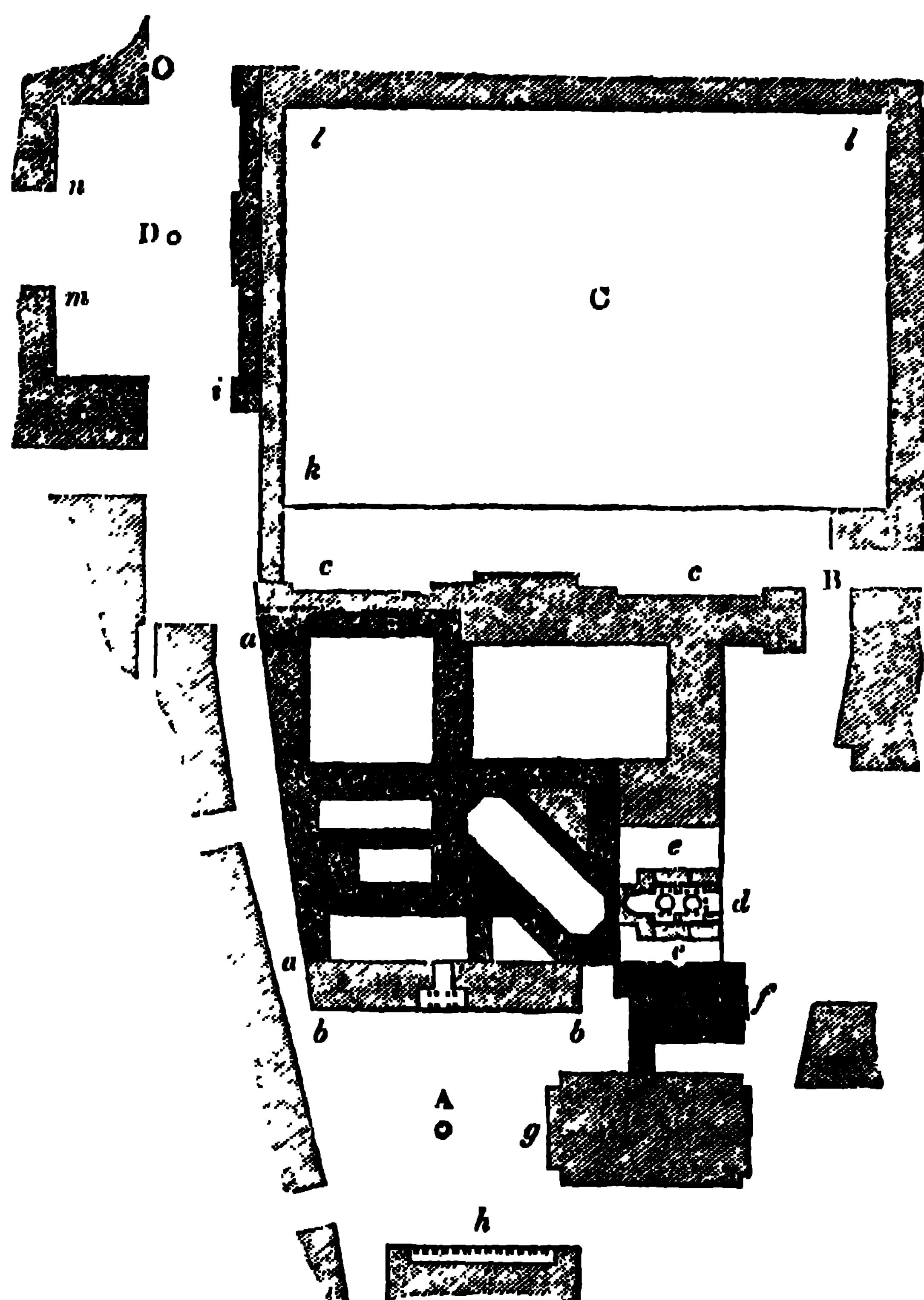
The cathedral, or Frauen-kirche, which was begun by Duke Sigmund in 1468, and completed twenty years afterwards, is in a poor and mean style of Gothic, besides being very homely in its materials. 'Both the nave and towers,' says Dr. Dibdin, 'which are of red brick, are frightful in the extreme; without ornament, without general design, without either meaning or expression of any kind. The towers cannot be less than 350 feet in height, but the tops are mere pepper-boxes.' The edifice is therefore remarkable chiefly for its size, although its dimensions are by no means extraordinary, the length being 321 feet English, the greatest breadth 122, and the height to the summit of the vaulting of the nave 110. Neither does the interior contain much that is particularly interesting, excepting the large and sumptuous mausoleum in the middle of the choir, which was erected in 1603-12, by Maximilian I., to the memory of his great-grandfather the emperor Louis IV. This splendid work of art, which Dibdin declares to have 'hardly any superior of its kind throughout Europe,' is of black marble and bronze, and was executed from the designs of Peter Candid, who also painted the principal altar-piece.

The next in point of antiquity is St. Salvator's, now the Greek church, erected in 1494; after which, according to the succession of dates, comes St. Michael's, or the Hof-kirche, of which the first stone was laid April 18th, 1583, by Duke William V. It is 280 feet in length, and is in the form of a cross. The architect was Wolfgang Müller, and of what he has here done Dibdin speaks in the highest terms of praise. 'I can recollect nothing,' says he, 'to be put in competition with it as a comparatively modern edifice. The interior is, as to Roman architecture, what that of St. Ouen is as to Gothic, although the latter is of considerably greater extent. It is indeed the very charm of interior architecture.'

The church of St. Caietan, a work of the seventeenth century, when it was founded by the electress Adelaide, and completed in 1675, was designed by an Italian architect, Agostino Barella of Bologna. It is 220 feet in length, by 120 in its greatest width, being in the form of a cross, and it has a centre cupola raised on Corinthian columns. The façade however is of much later date than the rest, not being built until 1767, when it was executed after the designs of Couvillers, a Frenchman. Dibdin says of this church, that it is quite of the Italian school of art, and seems to be a St. Peter's at Rome in miniature—the façade beautiful and striking. Again, 'It is doubtless one of the most beautiful churches in Bavaria.' But correct as such opinion might be at the time when he visited Munich, in 1818, it is no longer so. The present Allerheiligen Kapelle, Ludwigs-kirche, St. Bonifacius, did not then exist; nor, with the exception of the Glyptotheca, which was merely in progress, not one of the many splendid new fabrics which now adorn the Bavarian capital had even been commenced, as may be seen, by referring to our Table of Buildings. Neither did the building itself at that time contain Thorwaldsen's magnificent work, the tomb of Eugène Beauharnois, duke of Leuchtenberg, erected to him by his widow, in which, besides a colossal figure of the ex-viceroy of Italy, there are two beautiful genii, and a female representing the muse of History, while a portal of Grecian design forms a rich architectural background to the whole composition. The Trinity church, formerly that of the Carmelite nuns, was begun in 1704, and is a rotunda with a cupola on eighteen Corinthian columns. The façade is of the Ionic order.

The *Alte Residenz*, or Old Palace, is a vast pile, said to have been erected from the designs of Vasari, by Maximilian I., at the close of the sixteenth century. The west front is about 550 feet in length, and has two noble Doric portals, ornamented with bronze statues. Within are three courts, adorned with rich fountains and bronze figures; while as to the interior itself, the stores of art of every description there treasured up almost exceed credibility.

What is called the *Schöne* or *Reiche Kapelle* well deserves its latter epithet, being composed of and filled with the most costly materials; lapis lazuli, jasper, amethysts, gold, ivory, display themselves everywhere, even in the mosaic floor: in short, such is its marvellous gorgeousness that this single apartment is said to have cost Maximilian I. several millions of florins. To attempt to give any idea of the other contents of this palace and its numerous cabinets—of the works in painting, carving, bijouterie, &c. of which it is the repository, is here utterly impossible. Yet, vast as this pile before was, it has been prodigiously extended by two others, namely, the *Neue Residenz* (new palace), or *Königsbau*, and the *Festbau*, which may be considered as incorporated with it, and forming together with it one enormous mass of building, as is apparent from the accompanying *situation's plan*, comprising the whole of that extensive and varied group of architecture extending from the façade of the post-office to the old picture-gallery on the north side of the Hof-Garten and that end of Ludwigs Strasse.



A Max Joseph's Platz.
B Hof-Garten Strasse.
C Hof-Garten.
D Odeon-Platz.
a a Alte Residenz, or Old Palace.
b b Königsbau.
c c Festbau.
d Allerheiligen Kapelle, or Chapel Royal.
e e Gardens.
f Old Hof-theatre.
g New Theatre.
h Postgebaude, Post-office.
i i Bazaar.
k k Hof-arkaden.
l l Picture Gallery.
m Odeon.
n Leuchtenberg Palace.
O Ludwigs Strasse.

The Königsbau (*b b*), begun in 1826, from the designs of the celebrated Leo von Klenze, adjoins the Old Palace at its south-west angle, and forms the north side of the Max-Joseph's Platz, the east and south sides of which are occupied by the theatre and post-office respectively; while the centre is adorned with the splendid bronze monument of the late king Maximilian Joseph, a sitting colossal figure on a double pedestal, whose sides are covered with reliefs, and the lower one has the figure of a lion partly projecting from it at each angle. Of the *Place* the façade of the Königsbau, 406 feet in length, forms one entire and the longest side, it being somewhat narrower at the other end, or the side occupied by the Postgebaüde. Not only the style of the Königsbau, but the design itself, bears a strong resemblance to that of the Palazzo Pitti at Florence; more in fact than is at all desirable, because if noble and imposing, it is also too severe and monotonous, and by no means corresponds with or suggests the more refined style of decoration employed in the interior. The ground-floor and that above it have each twenty-three arches in one continued line, of which the centre ones below are larger than the others, and form open entrances to the loggia or carriage vestibule, as in the Strand front of Somerset House. The third story rises above the rest of the elevation, it being only eleven windows in length, and has therefore a balustraded terrace on each side of it, forming the flat roof above the remainder of the façade; in which respect the building also resembles the original one at Florence. Closely however as the architect has followed his model for the most part, he has not scrupled to innovate upon it in some respects, since, besides giving a Doric entablature to the ground-floor, he has introduced an order in pilasters in each of the upper ones; the first with Greek Corinthian capitals, the other with Roman.

After all, it is the interior of the Königsbau which has obtained for the building its celebrity, on account of the magnificent and classical taste displayed in its decorations, the extensive employment of fresco-painting and sculpture, and the high talent manifested in them by Schnorr, Zimmermann, Kaulbach, Schwanthaler, and other artists, who have here had ample scope allowed them. Those who wish for any particulars respecting them, may be referred to the 'Visits and Sketches' of Mrs. Jameson, who has spoken of some of the apartments rather at length and with no little warmth of admiration. Unfortunately however there is one pervading defect unobserved, or at least unmentioned by her, and which, as far as the architect is concerned, detracts very materially from his praise, and from the merit of all the rest; which is, that there are no beauties of any kind in the plan, consequently nothing has in that respect been sacrificed to architectural effect, notwithstanding which, the arrangement is most inconvenient and faulty. In fact, it is decoration alone, rather than architecture, which here displays itself; whatever praise therefore may be due to Von Klenze for the share he may have had in conceiving or suggesting, or even in designing much of the embellishment, he certainly has shown neither ability nor study in regard to anything else. The staircase on the east or king's side leads through two ante-rooms (whose walls are of scagliola in imitation of coloured marbles, with painted friezes, representing respectively the history of Orpheus and subjects from Hesiod's 'Theogony') into a saloon or reception-room 32 feet square, the walls and ceiling of which are adorned with a series of subjects from Homer, painted in fresco by Schnorr. The next in course is the throne room (58 ft. 6 in. by 33 ft. 4 in.), the walls of which are entirely covered with gildings, with the exception of the pilasters and mouldings, and decorated with arabesques in polished and dead gold, while the friezes by Schwanthaler exhibit different subjects from Pindar. The gilding alone of this single room is said to have cost 72,000 florins. Here the rooms on this side may be said to terminate, further progress being interrupted by their majesties' private rooms; therefore those beyond them must be approached from the staircase at the north-west angle of the building, which leads to nearly the same number of rooms terminating in the queen's throne-room and drawing-room, the former decorated with encaustic paintings by Kaulbach, of subjects from Klopstock. Another strange oversight in the plan is, that the dining-room (painted by Zimmermann with a series of subjects from Anacreon) is placed immediately behind the king's throne-room, in such a manner that the latter must be made use of as a passage-room to it. It cannot therefore be denied that the plan is positively bad; and even many more defects in it might be pointed out The whole indeed seems to be fitted for nothing more than a series of rooms not intended to be occupied, but to remain always open to free inspection, as a continuous gallery exhibiting a succession of *stanze*, each appropriated to one set of wall-paintings and other decorations; and as far as concerns embellishment, each is in itself a study. It is impossible to particularise further than we already have done, except merely to mention, that on the upper floor, forming the loftier part of the façade, there are apartments for entertainments, among which is a ball-room, 62 feet by 37, and 27 high, with semicircular ends, and adjoining it a *Blumensaal*, or hall of flowers, 68 feet by 36, opening to the terrace over the east end of the building; and the four Nibelungen-saale (on the ground floor, at the west end of the front), so called from Schnorr's magnificent frescos, the subjects of which are taken from the celebrated old German epic, the Nibelungen Leid.

The second and later addition to the Residenz, which is also by Klenze, is what is called the *Festbau* (*c c*): it has a façade towards the Hofgarten (of which it extends along the south side about 800 feet in length) in the Roman style,

with an Ionic colonnade in the centre, upon which are a series of allegorical figures by Schwanthaler. The throne-room is intended to contain eighteen colossal statues of bronze gilt. The Hofgarten (*c*) itself is a planted square of about 1100 feet from east to west, and 700 from north to south. The west side may be considered the Palais Royal of Munich, it being lined throughout its whole extent by arcades, beneath which are cafés, &c., in that portion which belongs to the Bazaar; while that distinguished by the name of the *Hof-arkaden* (*k*) is decorated with a series of sixteen frescos by Sturmer, Förster, Zimmermann, Schilgen, Eberle, and other artists, illustrating as many events in the annals of Bavaria. This national historical gallery, as it well deserves to be called, was completed and opened to public view, October 3, 1829. In continuation of the *Hof-arkaden* are the arcades of the bazaar, where, in compartments between the doors and windows, are twenty-eight smaller frescos representing Italian views, all of which are by Rottmann, who has here shown great ability as a landscape-painter. The principal front of the bazaar itself (*i i*), another of Klenze's productions, faces the Odeon-Platz, of which it forms the east side. It is in a simple but tasteful style of Italian architecture, with enriched pannels between the larger arches of the ground-floor, and grouped windows above, consisting of lesser arches, whose archivolts rest upon Corinthian pilasters.

Along the north side of the Hofgarten extends the old picture gallery (*l l*), arranged in a suite of rooms over another lengthened arcade. The rooms themselves are not well adapted for their purpose, being lighted by windows on each side; but they are about to be appropriated to extensive collections of carvings in ivory, &c.; and all the choicest pictures will be deposited in the Pinakothek, as will those from Schleissheim and the other royal collections, the total number of which is not less than nine thousand. The abundance of works of art in Munich is quite prodigious, and that not in painting alone, but in sculpture, as is testified by the Glyptotheca alone.

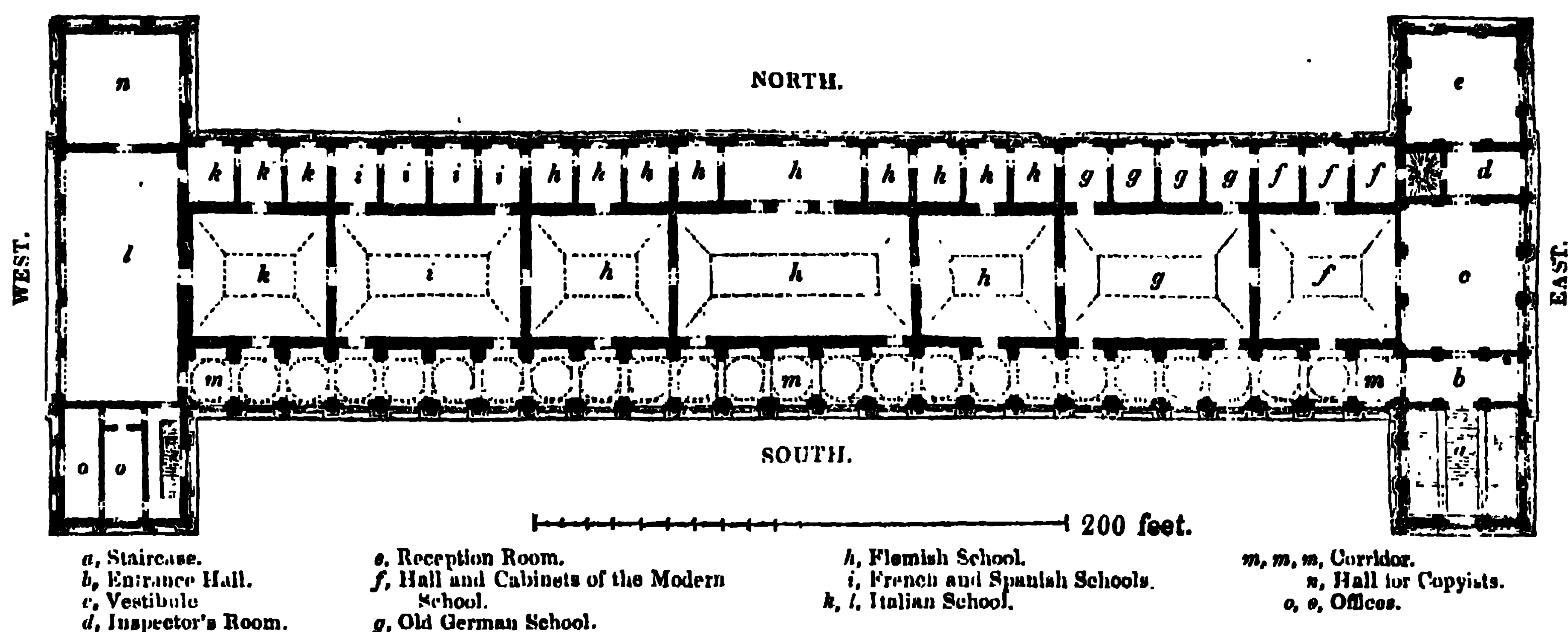
Though by the same architect (Klenze), this last-mentioned museum of sculpture is very different in style from that of the additions to the Residenz, as it may be said to be pure Greek, yet not so much a copy as a free application of Grecian architecture. The building is at a considerable distance from any others, standing with its south or principal front towards a large open space called the Königsplatz. It is not more than about 220 feet square in plan, with a court in the centre; yet, although in point of magnitude it is by no means remarkable, it is far more imposing in appearance and of ampler proportions than many edifices of much greater extent. Although highly encomiastic in her account of the Glyptothek, Mrs. Jameson says little of the façade, and that little is incorrect; for she describes it as having a portico of twelve Ionic columns, raised on a flight of steps; whereas the latter cannot properly be so termed, for they consist of three very deep gradini, continued as a base along the whole front, like those in some of the antient Greek temples; while what is said as to the number of the columns, though correct in itself, is apt to lead into a singular error as to their disposition, only eight of the columns being in front and the others behind, in such manner as to form a second range of four columns and four antæ, or seven intercolumns, five of which are open, and the one between the two antæ at each end closed up or blank. Consequently it may be termed a compound of portico and loggia, and might be described technically, both clearly and briefly, as consisting of an Ionic *octastyle* projecting before a *tetrastyle in antis*. [CIVIL ARCHITECTURE.] Hence there is a richness and intricacy of columniation, and a variety of light and shade, to which none of our porticos make any pretension; nor can we refer to anything at all similar, except it be the small but highly picturesque architectural bit at the north-west angle of the Bank of England. In its dimensions this portico differs very little from that of the Post-Office or that of University College, London; but it is of much loftier proportions than the latter, and more classical in style and in intercolumniation than the former; besides which, while it rises, like that of University College, above the rest of the edifice, and in a greater degree, it is relatively much ampler than that or any other which we possess, for we have not one example in which the portico itself is not small in comparison with the mass to which it is attached. Another circumstance wherein this portico differs far more markedly from anything of our own, is the richness of its cornice and acroteria, and more than all, the splendid display of sculpture in the pediment, which is not filled with sculpture in relief, but recessed or hollowed so as to admit detached figures or statues, as was the case in the temple of Ægina, and may be seen in the models of its pediments at the British Museum. The composition itself, intended to exhibit the various operations of the plastic arts, modelling, sculpture, carving, &c., was designed by Wagner, but the figures were executed severally by Schwanthaler, Leeb, Haller, and others, and were first put up in 1836. The six bronze colossal statues for the three large tabernacle niches on each side of the portico, and which constitute the remaining architectural decoration of this front, still remain to be added; and when that shall have been done, this façade will be a fine and consistent example of modern Greek architecture, not only noble in all its embellishments, but free from any of those insignificant features which too often mar an entire design. The interior is divided into a series of rooms, of which the two rotundas at the angles of the place are lighted from above, through lanterns and domes; the others by large semicircular or lunette windows, above their cornices, and towards the inner court. The first rooms, beginning with those on the left hand, or west side of the vestibule, are appropriated to Egyptian antiquities and other works of early art; to these succeed the Ægineten Saal, or Hall of Ægina marbles, the Apollo Saal, the Bacchiden Saal, and the Niobiden Saal, which last is at the west angle of the north front, and is lighted by one of the two windows on that side of the building. The space between that and the corresponding angle is occupied by what are called the *Fest Saale*, two large apartments whose walls are entirely covered with frescos by the celebrated Cornelius and his pupils. At the north-east, answering to the Niobiden Saal, is the Heroen Saal, from which there is a descent into the Roman hall or gallery, the most spacious of all, and which, in consequence of its floor being lower than the general level, is loftier than the rest. This as far exceeds the other sculpture-rooms in the splendour of its architecture as it does in extent, and it is divided into three compartments, each of which has a slightly concave dome; the walls are in imitation of *fior di persico* marble, and the whole is a splendid combination of embellishment. An ascent of steps at the farther end leads up into the *Saal der farbigen Bildwerke*, or hall of coloured marbles, the rotunda at the south-east angle of the front, adjoining which is the hall of modern sculpture, containing those two admirable specimens, Canova's Paris and Thorwaldsen's Adonis. This room is the last of the suite, and brings the visitor again to the entrance vestibule. Although sufficient architectural unity is kept up throughout, there is also a very pleasing degree of variety, not only as regards colour and decoration, but the forms, dimensions of the rooms, their domes, vaultings, and ceilings, and their enriched pavements.

Mrs. Jameson's work supplies much interesting remark upon the antient sculptures here collected. For a catalogue raisonné of the whole collection, we would recommend Schorn's 'Beschreibung der Glyptothek;' and for accurate information as to the building itself, we refer our readers to the plates of it in Klenze's own 'Entwürfe,' where, besides plan, and various sections, &c., will be found the principal ornamental details, and several interior views in outline.

The *Pinakothek*, or Pinacotheca, another, and in some respects the best, of Klenze's works, is a much more extensive edifice than the Glyptothek, and altogether different both in its plan and its style of architecture, although it resembles it in being perfectly insulated, and standing in an open situation at no very great distance north-east from the other building, and in the immediate vicinity of the spacious infantry barracks. The first stone was laid April 7th (Raphael's birthday), 1826, by the royal founder himself, and the building was completed in about ten years. The annexed plan, which is that of the upper floor, will serve greatly to abridge description, and to convey a clear idea both of the form of the edifice and the arrangement of the galleries.

Although each side of the building presents an architectural façade of uniform character, that facing the south may be considered the principal one. The lower portion consists of a very lofty ground-floor, with a series of arched windows within square-headed framings, surmounted by cornices, and resting upon a socle, or rather podium, formed by two courses of large rustics. In the centre of that side

[Plan of the Upper Story]



that is beneath the loggie (marked *mm* in the plan) are eleven such windows on each side of the entrance portico, or rather porch, as it rises no higher than the ground-floor, which consists of four Ionic columns, whose entablature supports a balcony in front of the three centre arcades or windows of the loggie above. Along the upper floor the same order is continued throughout in half-columns against the piers of the arches between them, which, although glazed, cannot so well be considered so many separate windows as one connected arcade. This order is crowned by a bold cantilever cornice and antefixæ, terminating the elevation; for the attic does not rise immediately over the order, but is set back as far as the hinder wall of the loggia. The projecting ends of the plan assist greatly, not only in giving an air of solidity as well as variety to the general mass, but also greater importance to the lateral façades. On the lower floor, at the west end of the building, are a library, and rooms for collections of prints and drawings. The rest consist of rooms required for the keeper and other officers of the establishment. The upper floor is sufficiently explained by its plan. The larger rooms in the centre are lighted from above; and although the height to the top of their lanterns is rather more than fifty feet, this seemingly unnecessary loftiness, while it contributes greatly to architectural importance, and affords ample space for decoration above the cornice of the rooms (of which full advantage has been taken), also causes the light to fall upon the upper part of the walls themselves, the height to the cornice whence the ceilings spring not being more than twenty-five feet, so that the tops of the highest pictures can never be much more than twenty feet from the floor, and must have the light full upon them. Not only the ceiling but all the decorations of the rooms may be pronounced magnificent, and both the floors and the dados, or lower parts of the walls, are of Bavarian marble, one practical advantage of which last is that no pictures can be hung lower than within three feet of the ground.

In addition to these magnificent rooms, and about 1500 of the choicest pictures in the world, there is what almost anywhere else would be considered a museum and gallery of itself, namely, the *Loggie*, forming a line of 400 feet in extent, decorated throughout with arabesques on its walls, and with historical frescos in the lunettes facing the arches, and subjects in each of the small cupolas covering the twenty-five compartments of this corridor. These frescos, which have all some reference to the history of art, were designed by Cornelius and executed by Zimmermann and others.

The same year in which this Pinacotheca was begun was also distinguished by the commencement of another monument of architecture, which of itself would have almost sufficed for the fame either of Klenze, or his royal patron, namely, the Allerheiligen Kapelle, or Chapel Royal (*d*), on the east side of the Residenz. In its style however it does not at all resemble any other portion of it, but shows itself as a distinct composition. Neither does it all resemble any other works of the same architect, being in the Byzantine or Lombardic fashion [Lombardic Architecture], and the façade bearing some resemblance in parts to that of San Zeno at Verona. It may be described as about 70 feet wide and as many high, exclusive of the lower portion on each side, covered with a half-gable, and whereby the entire width is increased to about 100 feet. The centre, which is the breadth of the chapel itself, terminates in a flattish gable, beneath whose sloping mouldings is a series of small pendent or corbelled arches. These mouldings and arches are returned horizontally at the extremities, above broad pilasters or buttresses, which are surmounted by small tabernacles serving as pinnacles to the angles, as is also the case with the half-gables. Slenderer pilaster shafts, whose carved caps do not reach quite up to the corbelling of the gable, divide the front of the chapel itself into three compartments, the middle and widest of which contains a rich portal, with receding columns and arches, with a bas-relief in the lunette or semicircular tympanum over the square-headed door, and a statue on each side of the canopy or pediment which crowns this entrance. Above it is a large circular or wheel-window; and in each of the other compartments are two round-headed windows, one above the other; there is also a single window of the same design, beneath each of the half-gables. With respect to the plan of the interior, although it may be said to be simple in arrangement, it is such that it is exceedingly difficult to describe it verbally with precision: the body of the chapel is 105 feet in length within, exclusive of the apsis, or large semicircular tribune, for the altar, at its western extremity (elevated about three feet above the rest of the pavement), which gives about twenty feet more. This space cannot be described as nave and choir, or either separately, but as consisting of two square compartments of thirty feet, each covered by pendentives and a dome, and separated or united by an intermediate narrower space. On each side these compartments have below three circular-headed arches on columns, opening into what may as properly be designated loggie, as side-aisles; and above as many windows of the same form, not however immediately over the arches just mentioned, as the clerestory windows over the arches in the nave of a church, but at the back of the upper recesses, or tribunes, corresponding with those below. Consequently the width in the upper part of the building is, in appearance at least, greatly extended, and increased from thirty to nearly sixty feet across. Further than this, description as to plan must not be attempted; and if that has been attended with difficulty, we ought to despair of conveying anything like a distinct notion of the profuse and gorgeous yet solemn decorations of the whole interior: the pavements, walls, arches, pendentives, domes—all is embellishment; and all that is not marble or mosaic is painting and gold. The columns are of red Salzburg marble, with white bases and gilded capitals; the socle, or bottom of the walls, is also of red marble throughout; and the rest, to the height of the upper loggie, encrusted with different coloured marbles or scagliola, of which the prevailing masses are of a greenish hue; the next, veined red or blue; and the smaller surfaces dark-grey or black. The parapet of the recesses over the side-loggie and some intermediate parts are ornamented with a variety of coloured mosaic-like patterns, on a ground of stucco lustro. All the rest is entirely covered with fresco painting, upon a gold ground, after the manner of the mosaics in St. Mark's, Venice, and the cathedral of Monreale near Palermo. The subjects were designed, and chiefly executed, by Professor Hess: those of the first compartment and its cupola are all symbolical of the events of the

Old Testament; those of the other, of the New; while those introduced in the large intervening arch refer to the connection between the two. Thus what, judging by the the plan alone, appears a rather fanciful division into two equal spaces, without any central cupola, is beautifully 'motived' and full of meaning. Many of the figures are colossal; those, for instance, of the Redeemer and the Deity himself, in the large tribune of the principal altar, which may be considered as the focus where the power of art is concentrated. Notwithstanding the almost unequalled gorgeousness of this magnificent sanctuary, so far is it from being at all gaudy, that it is rather characterised by an unusual degree of solemnity, to which effect the gold ground of the frescos contributes in no small degree. The building was consecrated and opened for service, Nov. 1st, 1837, within little more than ten years from its foundation.

On the south side of this magnificent chapel is what was formerly the Hof Theatre (*f* in plan), but it is not now made use of as such, the larger and adjoining building (*g*) being now the principal theatre. The present structure, which has a fine Corinthian portico of eight columns, towards the Max-Josephs Platz, was originally erected by Karl Fischer (died 1820), and rebuilt according to the first design, after being burnt down in 1823. On the south side of the same platz is the new façade of what was formerly the Döring Palace, but is now converted into the post-gebaüde, or post-office (*h*). Like the opposite Königsbau, this is also in what may be termed the Florentine style, though of a different character. The length is 290 feet, the whole of which, exclusive of thirty-two feet at each end, is occupied by an open loggia of thirteen arches, resting upon Doric columns, with as many windows above them, besides two in each of the end compartments, that is, one on the ground-floor and one above it. All these windows are arched, but enclosed within square architrave mouldings, and crowned by cornices. There are also windows of the same description within the loggia, but only three on each side of the entrance, corresponding with the alternate arches. The whole is crowned by a cornicione, with an enriched band or narrow frieze beneath it, the pattern of which is white upon a red ground; for it should be observed that this building exhibits, to a certain extent, the application of polychromy, the general surface being coloured of a greenish hue, and that of the interior of the loggia of reddish-brown; while the rustic quoins, columns, archivolts of the arches, window-dressings, &c., are left white. On the west side of the Odeon-Platz (D), where, in front of the bazaar, is an obelisk of cast metal, ninety-six feet high, are the Odeon (*m*) and Leuchtenberg Palace (*n*), whose opposite fronts towards the street that runs between them present two handsome and uniform façades in the Italian style, of two stories above the ground-floor, of eleven windows in each, and with a small Doric portico, or entrance porch, of four columns. The large concert or ball room, on the principal floor of the Odeon, is 124 feet by 71, and 50 high.

Northwards from the Odeon-Platz runs the Ludwigs-Strasse (*o*), by far the handsomest and most regular street in Munich, having on its east side the Kriegs-ministerium, the new public library, and new Ludwigs Kirche; on its western side, the Maximilians-Palast, Blind Institute, &c., and terminating in the spacious quadrangle of the new Georgianum, or university buildings. We shall speak of these as they occur in the course from the Odeon-Platz to the other extremity of the street, therefore first of the palace of Duke Maximilian, a large insulated structure in the Italian style, of about 200 by 300 feet. The façade towards the Ludwigs Strasse (206 feet) somewhat resembles that of the Königsbau, although it is far less severe in character and more varied in its features. The ground-floor has three large arched doors in the centre, between four insulated Doric columns supporting a balcony in front of the three centre windows above. On each side of this portal are five windows, which, like those of the Postgebäude and lower floor of the Pinacothek, are round-headed within square dressings. Those of both the upper floors are square-headed, the first with pediments, the second without; the decorations of the principal rooms, including their parquetted floors and rich ceilings, are magnificent; the walls of the large reception-room, or first saloon, are adorned with six large compartments in fresco by Langer, representing mythological subjects. The ball-room, sixty by forty feet, and thirty-five high, is profusely embellished.

The next building, almost immediately opposite the preceding, is the Kriegs-ministerium, or war-office, and is the work of the same architect (Klenze). The façade, 248 feet in length, is also in the Florentine style, and consists of a centre having seven large arcades, filled in with door and windows on the ground-floor, and two stories above it, with two wings or lateral divisions, five windows in width, and a story lower; at the external angles and those of the centre are courses of bold massive rustics, and the windows, which are arched throughout, are similarly decorated on the two upper floors, although the wall itself is left plain. The spandrels, or spaces between the arch-stones, of the seven arcades of the ground-floor are entirely filled up with military trophies and armour, which mass of sculpture gives unusual richness and character to the whole. The building stands at the angle of the Schonfelds Strasse, towards which street its south side presents a far more extensive and varied façade (363 feet), uniform as to general style, but different as to composition, it being divided into a centre and two advanced wings, connected on each side by four arcades with windows in them, similar to those of the other front. The end pavilions or wings are also in every respect the same as towards the Ludwigs Strasse, except that they are only three windows in breadth. The centre or body is eleven windows in breadth, and rises somewhat higher than the wings, having a series of mezzanine windows just beneath its cornicione.

The remaining public buildings are all by Gärtner, and the first, immediately after passing the Kriegs-ministerium, is the new public Library and archive, whose lofty façade (495 feet in length) is a compound of the Florentine and Lombardic styles. The lower floor forms a massive rusticated basement, 44 feet high, with three portals in its centre. Each of the upper floors has twenty-five arched windows, and the whole is crowned with a cornice of very peculiar design.

The Ludwigs Kirche, which is also in the Lombardic or round-arch style, but treated with considerable originality, is no less remarkable for the beauty of its execution than the richness of its design. The front, somewhat more than 100 feet to the summit of the gable, has two towers of double that height, which give the façade five compartments, the centre one, or that corresponding with the nave within, being an open vestibule, with arches resting upon delicately sculptured columns. Immediately over this porch are five niches with colossal statues of Christ and the four Evangelists, and crowned with arches decorated with arabesques after the mode of Giotto. Above these is a large rose window, and then the gable ornamented with foliage and open work, with a cross on its summit, and colossal statues of St. Peter and St. Paul at its angles, which, as well as those in the niches, were modelled by Schwanthaler. Within, the nave or body of the church is 246 feet by 43, and upwards of 80 feet high. Here too, though not so profusely as in the Allerheiligen Kapelle, fresco-painting has been employed;—chiefly in the tribune at the end of the choir, and in those at the extremities of the transept. The principal subject is the Last Judgment by Cornelius, allowed to be one of the highest efforts of art in the present century.

Nearly opposite this church are the Blind Institute, and what is called the Damenstifts-gebäude, two more of those extensive masses of building which give so much grandeur to this street. The former of these is upwards of 220 and the other 400 feet in length; both are by Gärtner, and both somewhat similar in style to the Public Library. The same may be said of the Georgianum, or new university buildings, at the northern extremity of this noble street, where they form a large quadrangle, into which the street itself runs.

The church of St. Maria Hilf, in the Au suburb, the first stone of which was laid 28th November, 1831, is another noble architectural work, yet quite different in character from any of the preceding, being in the pointed or old German style. This building, which is quite insulated, has three portals in its west front, and above the middle one a large rose window. The tower is upwards of 250 feet in height, and the upper part of it consists of ornamental open work. Within, it is divided into a nave and side aisles, the former of which is nearly 80 feet high. Independently of its architecture, this church deserves notice on account of its nineteen splendid painted windows, by Ainmüller and others, which show the high degree of perfection to which that branch of art has been brought of late years in Bavaria. These paintings were executed chiefly from the designs of

Ruben and Schraudolf, and under the inspection of Gärtner, although not the latter, but Ohlmüller (who died April 22nd, 1839) was the architect of the building.

The new Basilica of St. Bonifacius, by Ziebland, now in progress, promises, when completed—which it is expected to be in 1842—to surpass every other religious edifice in the city, hardly excepting the Allerheiligen Kapelle itself. Like that building, it is in the Byzantine or Lombard taste, both as to architecture and decoration, but is upon a much more extensive scale, being 250 feet long and 120 feet wide: it is divided within into a nave and two aisles on each side of it, by sixty-four marble columns of a greenish tint, disposed in four rows. Of the middle aisle, or nave, the width is 51 feet and the height 70; of the four others, the width 15 feet and the height 40 feet. The pavement is of marble mosaic, and the roof of open timber work, the beams of which are not only carved, but richly decorated with painting and gilding, and the ceiling between them azure, with gold stars. The walls of the outer side aisles are stuccoed with scagliola in imitation of different coloured marbles, but those of the other parts of the building will be painted in fresco by Hess, with subjects from the history of St. Bonifacius. In the rear of this magnificent church (the front of which, towards the Karls-strasse, has a portico of eight Corinthian columns with three bronze doors) will be another building attached to it, intended as a theological seminary, directly facing the Glyptotheca, to which it will form a corresponding piece of architecture, on the south side of the Königs Platz.

Several other buildings and public monuments might be mentioned, but however deserving of notice in themselves, they are only of secondary rank. What has been accomplished at Munich within little more than twenty years, reckoning from the foundation of the Glyptotheca, constitutes an epoch in the history of modern art, not only as regards architecture and sculpture, but both fresco and glass painting. Instead therefore of being at all an hyperbole, the title of the German Athens does no more than simply characterise a city that is, as it were, one vast museum of architecture and fresco-painting. In fact, on comparing a map of London with that of Munich, the latter, though so very much smaller a city, strikes the eye by the number of its public buildings and the great space which they occupy. The plan of Munich, published in the series of maps by the Society for the Diffusion of Useful Knowledge, will be useful to those who take any interest in the present article. This plan does not however show the situation of all the buildings here mentioned, nor the situation of any of those beyond the Kriegs-ministerium in the Ludwigs Strasse, nor the Basilica of St. Bonifacius. But two very conspicuous features in it suggest the propriety of mentioning the spacious new Friedhof, or public cemetery, and the beautiful park near the north-east angle of the Hofgarten and Picture Gallery, called the English Garden. The latter is laid out with plantations, intersected by streams of water, and embellished with statues and various ornamental buildings, the most remarkable of which is the circular monopteros of twelve Ionic columns, erected in 1833, as a monumental temple in honour of the elector Karl Theodore, the founder of the garden; nor is it so remarkable on account of its design, as for exhibiting the first modern application of Greek architectural polychromy, the capitals of the columns and the mouldings of the entablature being enriched with various colours painted in encaustic. The other spot, the Père la Chaise of Munich, has, at its southern extremity, an extensive range of building consisting of a chapel and range of arcades, disposed in the form of a crescent about 550 feet in diameter.

The following architectural synopsis, on the plan of that accompanying the article London, will serve as a general recapitulation, and facilitate reference with respect to the architects and the dates of the buildings, as far as it has been possible to ascertain the latter correctly.

N.B. The measurements are reduced to English feet.

Table of the Principal Buildings, &c.

	Date.	Architect.	Remarks.
Frauenkirche	1468-94	Jorg Gankoffen	Gothic, two west towers 336 feet high.—336 by 115 feet.
St. Michael's	1583-95	Wolfgang Müller	
St. Caietan	1670	Agost. Barella	Façade, erected 1767, by Couvilliers; Doric and Ionic.
Trinity Church	1704-14	. . .	Rotunda, dome on 18 Corinthian columns.
General Hospital	1813	Fischer	
Glyptotheca	1816-30	Klenze	Grecian, Octastyle, Ionic portico
Reitbahn, Riding-house	1822	. . .	Italian, 300 by 80 feet.
Isar Bridge	1823-28	Probst & Klenze	Five arches, length 286 feet.
Theatre	1824-5	Fischer	Hexastyle, Corinthian portico.
Kriegs-Ministerium, or War-Office	1824	Klenze	Florentine style.
Odeon	1826	Klenze	Italian style.
Pinacotheca	1826	Do.	Italian, north and south façades 494 feet.
Synagogue . . finished	1826	Metivier	
Allerheiligen Kapelle	1826-37	Klenze	Romanesque or Byzantine style, 145 by 103 feet and 84 high.
Bazaar	. .	Do.	Italian, round-arch style.
Hof-arkaden	. .	Do.	
Protestant Church	1827-33	Pertch	Oval plan, 143 by 57 feet.
Königsbau	1827	Klenze	Florentine style, façade 406 feet.
Festbau	. .	Do.	Façade nearly 800 feet long, in the Palladian style.
Prince Maximilian's Palace	1828	Do.	Florentine style.
Leuchtenberg Palace	. .	Do.	Italian style.
Obelisk	1828-33	Do.	Bronze, 95 feet high.
Ludwigs Kirche	1829	Gärtner	Byzantine style, towers 209 feet high.
Pfarr-kirche, St. Maria Hilf	1831	Ohlmüller	Gothic, nave and side aisles.
New Public Library and Archive	1832	Gärtner	Façade 494 feet, Florentine style.
The Reichenbacher Bridge	1832	. .	Timber bridge, 675 feet long.
Blind Institute	1832	Gärtner	Florentine style, façade 214 feet.
Isar Thor or Gate	1833	Do.	Gothic or Old German style, three towers.
Polychrome Temple	1833	Klenze	Circular monopteros, Grecian Ionic.
St. Bonifacius	1833	Do.	Byzantine, nave and two aisles on each side.
Post-Office	1834	Do.	Florentine style, façade 290 feet long, 66 feet high.
Georgianum	1835	Ziebland	
Equestrian Statue of Maximilian I.	. .	Gärtner Thorwaldsen	
Damenstifts-gebäude	. .	Gärtner	Florentine style, façade 430 feet.
Monument of Maximilian-Joseph I.	1835	Klenze & Rauch	Colossal sitting figure; entire height of the monument, which is of bronze, 36 feet.

MUNICI'PIUM, a term which properly denotes, according to its etymology (*munus* and *capio*), the capacity of enjoying rights with the liability to duties. It is however used in the antient Roman writers to express a class or body, the members of which are called Municipes.

Municipium, as a collective name for a number of individuals, had different significations at different periods of Roman history. In its oldest sense, it signified those inhabitants of Italian towns which had a league or treaty with the Roman state, by which the citizens of such towns, though not Roman citizens, enjoyed, when at Rome, all the privileges of Roman citizens, except the suffrage and the eligibility to the honours of the state (magistratus), and were also subject to the burthens of Roman citizens: the Fundani, Formiani, Cumani, Acerrani, Lanuvini, and Tusculani are mentioned as examples. A Roman jurist (Servius, the son) says that municipes originally signified those who became citizens, their own state remaining perfectly distinct from and unconnected with the Roman state, and who were not allowed to attain to the dignities of the Roman state. (Fest. Epit., *Municipium.*) This first definition, which is as precise as a short one can be, still leaves room for many questions. Niebuhr is of opinion that the author of the first definition is mistaken in saying that such municipes were not Roman citizens; but his reasons for disputing the accuracy of the definition do not seem conclusive.

A second class of municipes is defined to be those whose State had become a part of or was blended with the Roman state, as was the case with the inhabitants of Caere, Aricia, and Anagnia. (Festus, *Municipium.*) But this would appear to be a misapplication or improper application of the term, inasmuch as this class of municipes comprehended those who ceased to have a State of their own, but were incorporated with the Roman state on such terms as the latter chose to grant.

A third class is defined (but the definition is somewhat obscure) to comprehend those towns which received the Roman citizenship, and at the same time became municipia: Tibur, Præneste, and other towns are mentioned as examples. Niebuhr observes that the places mentioned in this third class were either 'all Latin colonies or Italian towns, such as by the Julian Law, or by those which followed and gave it a wider application, became municipia in the later general sense.' It seems to be clear from this definition that municipium must here be understood not in the sense which it has in the first definition, but in the later sense of a town called a municipium. For the first part of the definition gives to the municipes of this class the full Roman citizenship; and the second part adds (what might very well have been understood without the addition) that the towns included in this definition must have had a local administration. These towns in effect became integral parts of the Roman state, having before been separate, and as a necessary consequence their local administration, which must still have subsisted, became subject to the general Roman law, instead of being independent of it. Such towns were the municipia of the Imperial period. The definition of municipes by Paulus is, 'those who are natives of the same municipium.' Ulpian, who also (*Dig.* 50, tit. i., s. 1) gives the same definition of municipes, refers to the *original* signification of the term: 'muneris participes recepti in civitatem ut munera nobiscum facerent.' He adds: 'but now, by an abuse of the term, municipes is the name given to the citizens of any particular town, as for example, a Campanus or Puteolanus. He who is born of a Campanian father and mother is therefore a Campanian: if his mother be of Puteoli, he is still a Campanian municeps, unless by some special privilege (privilegium) he is a municeps of his mother's city, a favour which is granted to some cities.'

It appears then that the municipium, as an antient Roman institution, may be defined generally as the communication of the rights of Roman citizens (and as a consequence, their liabilities) to Italian towns by treaty or agreement. It thus resembles the isopolity (*ἰσοπολιτεία*) of the Greeks. It is easy to conceive that the rights thus conferred might be either the complete rights of Roman citizenship or only part of such rights. After the freedom of the city was extended to all Italy, and subsequently to the provinces, there was no essential difference between a colonia and a municipium, though the origin of their connection with the Roman state was very different. [COLONY.] Thus, under the emperors, all the inhabitants of the same town, whether it was a colonia or a municipium, might with propriety be called municipes, notwithstanding the criticism of Gellius (xvi. 13).

Under the emperors we find various towns in the provinces, as in Spain and Britain, which were erected into municipia. The members of these towns were Roman citizens, and administered the affairs of their own community, subject to the general laws by which all Roman citizens were bound. A municipium had a corporate character, under which all the municipes, that is, all the members of the city, were comprehended. It would appear as if the decuriones were sometimes considered as the corporate body representing the municipium. The municipium could sue and be sued, and could acquire and hold property. The decuriones were the senate or council of a municipium; and the two chief magistrates were called duumviri. The municipia had also other local magistrates; and many of them had a mint, as we see from their extant coins. Thus the later municipia of the empire were in all respects like modern corporate towns, of which they were undoubtedly the origin and the type.

It follows from what has been said, that an Italian town was originally called municipium, or the inhabitants municipes, solely with reference to the participation of the townsmen in the privileges of Roman citizens, and that under the republic such municipia were in all respects independent of Roman law in their internal organization. The municipia included in the third definition and the later municipia erected under the emperors were improperly so called, inasmuch as the inhabitants of these towns became or were Roman citizens, and in all respects subject to Roman law.

The original signification of municipium in the old Roman constitution is discussed by Niebuhr (*Roman Hist.*, vol. ii.) in an instructive chapter which contains all the necessary references. It is not easy however to assent to all this writer's opinions.

MUNIMENTS. This word is a derivation from *munio*, which signifies 'I defend,' and originally designated those writings in which are recorded the transactions of former times, out of which existing relations, in respect of political rights, social rights, or property, arise. Hence, by showing their origin, they *defend* the possession of them by those who have rightfully inherited them.

But *muniments* has, in the course of ages, acquired a somewhat different sense; and from betokening the documents themselves, it is sometimes used to denote the *depositories* of these documents.

Still, by those who aim at speaking with precision, it denotes the written documents themselves. It is also rarely used in reference to any small collection of such documents, or when the interest to be *defended* is small. In such cases the correlative expressions are *title-deeds*, or *evidences*, which means however precisely the same thing, only on a smaller scale. But when we speak of the documents by which the rights of a person are defended in whom a large estate has centred, or who inherits an antient title, or vast manorial or ecclesiastical privileges, then the word of greater dignity, *muniments*, is often used; and still more when the evidences are spoken of which show the right of the crown of any kingdom to its possessions, or the right of crown or people as sustained by written documents.

Private collections of evidences rarely contain anything that is of earlier date than the reign of Edward I. The public muniments of the English nation are believed to excel those of any other nation, both in number, preservation, and the remoteness of the period at which series or classes begin. Yet there is little previous to the reign of Richard I. There is no series commencing before that reign, except that of the Pipe Rolls, the Great Roll of the Exchequer, in which were entered, year by year, the receipts of the crown, and many of its payments. This series begins in the second year of King Henry II., and from that remote period to the year 1835, when this mode of keeping the account ceased, there is scarcely a roll wanting in the whole series. For the times previous to the beginning of that reign, one roll, which belongs to the reign of Henry I., only exists of this series; and the only other record of great importance before the reign of Henry II. is that called 'Domesday Book,' a survey of nearly the whole of the kingdom, made by William the Conqueror, a book which is still sometimes appealed to in determining rights of the crown, or of a subject against the crown, or of one subject against another.

For the particular classes of public muniments, their depositories, preservation, and other information concerning them, see RECORDS, PUBLIC.

MUNSTER, one of the four provinces into which Ireland is divided. It comprehends the southern part of the island, and is bounded on the west, south, and south-east by the Atlantic Ocean; on the north and north-east it is conterminous with the provinces of Connaught and Leinster. It is comprehended between 51° 25′ and 53° 12′ N. lat., and 6° 56′ and 10° 32′ W. long. Its general form is irregular: the greatest length is from the banks of the Shannon below Banagher to Mizen Head, 144 miles; the greatest breadth, at right angles to the length, is from Black Head, in Galway Bay, to the mouth of Waterford Harbour, 119 miles. The area is estimated at 5,210,472 statute acres, or 8141 square miles: the population at different periods has been as follows, giving, in 1831 273 or 274 to a square mile.

Population.

Date.	How ascertained.	Inhabited Houses.	Total Number of Families.	Families chiefly employed in Agriculture.	Families chiefly employed in trade, manufactures, and handicrafts.	Families not included in the preceding classes.	Males.	Females.	Total.
1792	Estimated by Dr. Beaufort .	184,546	..	..	..	..	..	..	1,068,000
1821	Under Act 55 Geo. III., c. 120	306,995	357,366	..	..	..	960,119	975,493	1,935,612
1831	Under Act 1 Will. IV., c. 19	330,444	376,051	244,770	62,285	68,996	1,093,411	1,133,741	2,227,152

The general character of the surface is mountainous. The north-western extremity beyond the Shannon is overspread by an irregular group of hills or mountains, of which Slievh Boughty, or Sliebh Baughta, and the Inchiquin Mountains, form part. Two ranges of mountains extend nearly across the province from east to west, enclosing the long narrow basin of the Blackwater. The northern range includes the Commeragh, Knockmeledown (2700 feet high), and Galtee Mountains (3000 feet high); Ballihowra Mountains; Slievh Mish, or Sliebhmish, near Tralee; and at the extreme west, Mount Brandon (3150 feet high), and the heights about Dingle: the southern range includes the Nagle and Bograh Mountains; Magillacuddy's (or Macgillicuddy's) Reeks (3405 feet high) and the other mountains of Killarney; and, in the extreme west, the mountains of Iveragh and Dunkerron. The Shehy and Glanerought Mountains, and other high grounds, are more to the southward. The western side of the province is the most elevated; and the principal streams (except the Shannon) flow between the mountain ranges from west to east.

The mountainous character of the province, and the general direction of the mountain-chains from east to west (or, more accurately, from east-north-east to west-south-west), determine the outline of the coast. From the mouth of Waterford Harbour, the boundary of Munster and Leinster, to Baltimore, the coast runs west-south-west, marked only by small bays, with intervening headlands, and by the æstuaries of several rivers, most of which turn rather abruptly to the south a little above their outfal. These æstuaries form the excellent harbours of Waterford, Dungarvan, Youghal, Cork, and Kinsale. At the south-western extremity of this line of coast is Cape Clear Island, which takes its name from a well-known promontory, the last point of British ground usually seen by vessels in their departure for America, and the first on their return.

The south-western and western coasts from Cape Clear are marked by a succession of bluff promontories, formed by the extremities of the mountain ranges, with the deep intervening bays of Dunmanus, Bantry, Kenmare, and Dingle. From Dunmore Head, which forms the northern extremity of Dingle Bay, the coast stretches away to the north-east, retaining its irregular and broken outline. It is marked by the bay of Tralee and the æstuary of the Shannon.

The chief rivers are the Suir, the Blackwater, the Lee, and the Bandon, all of which, except the Suir, in the upper part of its course, and the others just above their outfal, have a general direction from west to east. There are not many lakes, nor any of great extent; the principal are those of Killarney, which are much resorted to, from the picturesque beauties of the surrounding scenery. The bogs are neither so numerous nor so extensive as in most other parts of Ireland. The province is divided into the six counties of CLARE, CORK, KERRY, LIMERICK, TIPPERARY, and WATERFORD, to the separate articles on which we refer for further information. For ecclesiastical purposes Munster is nearly coincident with the archiepiscopal province of Cashel, which is, after the decease of the present metropolitan, to be united to the province of Dublin. It contains the dioceses of Cashel, Emly, Kilfenora, Killaloe, Waterford, Lismore, Cork, Ross, Cloyne, Limerick, Ardfert, and Aghadoe, several of which are already united, or are to be so at the decease of the present holders, by virtue of the late act for regulating the dioceses of the Irish Established Church.

This district, at an early period, consisted of two districts; one of these, which was sometimes designated South Munster, and included the district of Desmond, and probably of Ormond, comprehended all that part of the province which is south-east of the Shannon (Finglas's *Breviat of Ireland*) and is now divided into the five counties of Waterford, Tipperary, Cork, Kerry, and Limerick. The other part was north-west of the Shannon (Finglas's *Breviat*), and comprehended the present county of Clare. This part was antiently known as Thomond, North Munster, or O'Bryen's Country.

The kingdom of Munster existed at an early period of Irish history; and in the eleventh century Brian, surnamed Boiroime or Boro, acquired so high a reputation for valour and wisdom as to be enabled to usurp the sovereignty of Ireland antecedently held by the king of Meath. [MEATH.] Brian fell at Clontarf, fighting against the Danes and such of the Irish as supported them. The sovereignty of Ireland (which was indeed little more than nominal) did not remain in his family, which at the time of the English invasion seems to have retained only Thomond, the sept or family of MacArthy or MacCarty having acquired the chief dominion in Desmond or South Munster. The supremacy of Roderic O'Connor, king of Connaught and paramount of the Irish princes, was recognised by those chieftains. At an early period of the contest between the Anglo-Normans and the native Irish the prince of Thomond joined the party of the invaders (A.D. 1171); and when Henry II. in person landed at Waterford, the prince of Desmond made his submission (A.D. 1172), and was admitted to retain his principality on condition of homage and tribute. Waterford had been previously taken by storm, and Cork and Limerick were occupied; and the inferior chieftains vied with the superior in the readiness of their submission. Henry's wars having obliged him to weaken his army in Ireland, the natives rose in rebellion, and among them the princes of Thomond and Desmond. When the English rallied, Thomond was the first attacked; Limerick (which appears to have belonged to this principality) was taken (A.D. 1174 or 1175), and O'Brien, after a stout resistance, was obliged to submit (A.D. 1176). The prince of Desmond was also obliged to come to terms with Cogan and FitzStephen, two Norman adventurers, who acquired large possessions round Cork. Dissension among the natives themselves, or between them and the new comers, continued however for a long time to distract the province. South Munster was divided into counties, as at present, in the reign of Henry VIII., when Finglas drew up his 'Breviat;' but Thomond continued till after that time under its native princes. The chief families of the Anglo-Norman race who settled in Munster were the FitzThomases earls of Desmond, the Butlers earls of Ormond, the Geraldines, Barrys, Roches, and Cogans.

In the time of Elizabeth an attempt was made to establish an English colony in the province, on the lands of the earl of Desmond and his adherents, attainted for treason, but the attempt met with but little success. In this period

of frequent rebellion an officer governed Munster under the lord-deputy of Ireland, with the title of president. The province was about this time the scene of invasion by a Spanish force, which was obliged to surrender (A.D. 1601-1602.)

Clare, or Thomond, appears to have been formerly considered as belonging to Connaught rather than Munster. It was made shire-ground with Connaught in the eleventh year of Elizabeth's reign. It remained part of Connaught till 1601, when it was added to Munster, but it continued to be included in the Connaught circuit till as late as 1792.

MÜNSTER, one of the three governments into which the Prussian province of Westphalia is divided, is composed of the principality of Münster, the counties of Tecklenburg and Prussian Lingen, and the following mediatised territories, viz. the principalities of Rheina-Wolbeck (*i.e.* the portion not belonging to Hanover), Salm-Aahaus, and Salm-Bocholt, the counties of Horstmar, Recklinghausen, and Steinfurt, and the lordships of Anholt, Dülmen, Gehmen, and Gronau. It is bounded on the north-west by the Netherlands, on the north-east by Hanover, on the east by Minden, on the south by Arensberg and Düsseldorf, and on the south-west by Cleves. Its area is 2800 square miles, and the population, in 1838, was 435,275. It is divided into ten circles. The bishopric of Münster was formerly the largest in the circle of Westphalia, having an area of 3800 square miles, and 350,000 inhabitants. Originally, under the hereditary protectorate of the counts of Tecklenburg, it was elevated, in the twelfth century, to the rank of a principality of the empire. In 1708 a seat and vote in the council of the princes of the empire was granted to the bishop, who was director of the circle; but this grant was never carried into effect. After 1719 the archbishop of Cologne was always bishop of Münster. In 1803 the bishopric was secularised, and divided between Prussia, the princes of Salm-Salm and Salm-Kyburg, the rhinegrave of Salm, and the dukes of Oldenburg, Croy, Looz-Corswaren, and Aremberg. Prussia formed out of its share, which was about 1300 square miles, with 120,000 inhabitants, the principality of Münster, which by the peace of Tilsit, in 1807, was ceded to France, and united with the grand-duchy of Berg, from which a part of it was taken in 1810, and, with portions previously allotted to the above-mentioned princes, was incorporated with the French empire. The congress of Vienna restored to Prussia its principality of Münster, except a small district, together with sovereignty over the parts of the bishopric belonging to the houses of Salm, Croy, and Looz-Corswaren. Oldenburg likewise recovered its share, and Hanover obtained the sovereignty of the mediatised possessions in Münster of the duke of Aremberg.

MÜNSTER, the capital of the whole province of Westphalia, as well as of the government and circle of the same name, is situated on the river Aa, about eight miles above its junction with the Ems, and on the canal leading to Maxhafen. It lies in 52° N. lat. and 7° 30′ E. long., in a flat and moderately fertile country, 190 Paris feet above the level of the sea. It was formerly well fortified, but in 1765 the moat was drained, and the ramparts converted into public walks which surround the city, and are planted with four rows of lime-trees. At the same time the citadel was demolished, and the fine palace of the prince-bishop erected on the site. The town is, on the whole, well built; the houses are lofty, but irregular; those in the market-place have piazzas or colonnades; the streets are broad, and several of the public buildings worthy of notice. Of the eight churches, the principal are—the cathedral, with a chapel containing the monument of bishop Galen (standing in the Close, in Cathedral Square, which is surrounded by fine buildings), adorned with admirable sculptures and possessing a large library; and the church of St. Lambert, built in the finest Gothic style, to the lofty steeple of which the three iron baskets or cages are still suspended which contained the remains of the notorious John Bocholt, or Bockel, commonly called John of Leyden, and his two chief accomplices, who, after obstinately defending the city against the bishop, were made prisoners, and tortured to death with red-hot pincers. [ANABAPTISTS.] Among the other buildings are, the palace of the bishop, the senate-house with its fine Gothic front, the palaces of the barons von Romberg and Droste, and the mansions of several of the nobility. The university was abolished in 1818, and its funds assigned to the Max-Frederic's academy, founded by the king in 1824, to the Roman Catholic seminary, and the gymnasium of Münster and Paderborn. The academy has a theological and a philosophical faculty, and is attended by 350 students. The gymnasium has a library of 25,000 volumes, and is frequented by nearly 400 students. The loss which the citizens sustained by the secularisation of the bishopric has been made up by the city becoming the seat of all the great offices of the province of Westphalia, and still more by the trade in linens, woollens, yarn, Rhenish wine, hams, &c., which has increased in an extraordinary degree within the last twenty-five years. Münster has a surgical school, a veterinary school, a botanic garden, an asylum for the deaf and dumb, and a great number of charitable institutions. The population, in January, 1838, was 19,753.

Münster was founded at the end of the sixth century, and called Meiland, and at the end of the seventh century Miningerode. In 972 it was conquered by Charlemagne, who founded the bishopric, built a fine church and a monastery (*monasterium*), whence it derived its name Münster.

In the many wars which have desolated Germany, Münster was frequently taken; but it is above all celebrated on account of the peace concluded there in 1648, which put an end to the Thirty Years' war. The hall in the senate-house where the treaty was signed is still preserved in the same state, and is adorned with the portraits of all the ambassadors who were engaged in those memorable negotiations.

MÜNSTER, SEBASTIAN, born at Inglesheim, in the palatinate of the Rhine, in 1489, became a Franciscan monk, but afterwards adopted Luther's reformation, and repaired to Basle, where he was made professor of Hebrew, in which language he was very learned. He was also well acquainted with mathematics. He died of the plague, at Basle, in 1552. His works are—1, 'Biblia Hebraica Charactere Singulari apud Judæos Germanos in usu recepto, cum Latina Planeque Nova Translatione, adjectis insuper e Rabbinorum Commentariis Annotationibus, &c.,' fol., Basle, 1534-35; reprinted in 2 vols. fol., in 1546, with considerable additions and corrections. 2, 'Grammatica Chaldaica,' 4to. 3, 'Dictionarium Chaldaicum non tam ad Chaldaicos interpretes, quam ad Rabbinorum intelligenda Commentaria necessarium,' 4to. 4, 'Dictionarium Trilingue,' Latin, Greek, and Hebrew, fol. 5, 'Captivitates Judæorum incerti autoris,' Hebrew and Latin, 8vo. 6, 'Catalogus omnium præceptorum legis Mosaicæ, quæ ab Hebræis sexcenta et octodecies numerantur, cum succincta Rabbinorum expositione et additione traditionum,' &c., Hebrew and Latin, 8vo. 7, 'Organum Uranicum; theorica omnium planetarum motus, canones,' fol. 8, 'Cosmographia Universalis,' fol., 1544, which was translated into German, French, Italian, English, Bohemian, and other languages. It is one of the first universal geographies published in modern times, and is remarkably well executed considering the age in which it was written. The author is most diffuse in treating of Germany and Switzerland. He gives a description of the principal towns, their history, the laws, manners, and arts of the people; the remarkable animals of the country, the productions of the soil, the mines, &c.; and the whole is illustrated by woodcuts, with a portrait of the author. Münster mentions several learned men of his time who furnished him with an account of their respective countries, of Sardinia, the Illyricum, &c. He also gives specimens of several languages. 9, 'Rudimenta mathematica in duos libros digesta.' 10, 'Horologiographia,' being a treatise of gnomonicks.

Münster translated into Latin several works of the learned Hebrew grammarian Elias Levita on the Massorah, and on Hebrew grammar. He also wrote notes to Pomponius Mela and Solinus. His Commentaries upon several books of the Old Testament are inserted among the 'Critici Sacri.'

MUNTJAC, or MUNTJAK. [DEER, vol. viii., p. 363.] In 1838 Mr. Ogilby pointed out the characters of a new species of Muntjac Deer, a male, which had died at the gardens of the Zoological Society in the Regent's Park. This species is about the same size as the common Indian Muntjac, but has a longer head and tail. There was more blue and less red in the general tint of colour, and there was no white over the hoofs, so apparent in its congeners. Mr. Ogilby named the species *Cervus Reevesi*, after J. R. Reeves, Esq., who brought it from China. A female which accompanied the male was living when Mr. Ogilby described the species, and had lately produced a fawn which was spotted, as is generally the case with the young of the

Cervidæ. (*Zool. Proc.*, 1838.) Col. Sykes states that the *Cervus Muntjak* is the *Baiker* of the Mahrattas, and that it is a native of the Western Ghauts of Dukhun (Deccan), but is never seen on the plains. (*Zool. Proc.*, 1831.)

MUONIO-ELF. [BOTHNIA.]

MURA'D (AMURA'T) I., son of Orkhan, sultan of the Ottomans, succeeded his father, A.D. 1360, when he was forty-one years of age. He fixed his residence at Adrianople, where he raised a handsome mosque, which still exists. He conquered part of Macedonia and Thessaly, concluded a treaty of peace and alliance with John Palæologus, emperor of Constantinople, and married the daughter of the despotos or prince of Servia. Murad paid great attention to the discipline of his army, and especially of his infantry: he founded the corps of Janizaries, which afterwards contributed greatly to the extension of Turkish conquest. [JANIZARIES.] Contuz, the son of Murad, and Andronicus, the son of John Palæologus, fought together against the Bulgarians and other Sclavonian tribes, whom they defeated at Sirmium on the Danube. An intimacy grew up between the two young princes, of which Andronicus availed himself to persuade his friend to revolt against his father; and whilst both Murad and John Palæologus were in Asia, the two younger princes jointly assumed the sovereign authority in Europe. Murad however soon came back, bringing with him the Greek emperor; the troops, which were chiefly Turkish, returned to their allegiance; and the two young men, having shut themselves up in the town of Demotica, were taken prisoners. Murad sent Andronicus to his father at Constantinople, insisting upon his immediate punishment. John Palæologus ordered the eyes of Andronicus to be put out, but the operation was performed only upon one. Murad caused both his son's eyes to be put out, after which we hear no more of the young prince. Some time after, Manuel, the second son of John Palæologus, whom his father had associated with him in the empire, having given cause of suspicion to Murad, was besieged by the sultan in Thessalonica, whilst his own father did not dare to assist him. Manuel surrendered the town and cast himself on the mercy of the sultan, who forgave him. John Palæologus, ashamed of his humiliating condition, proceeded to Western Europe, leaving Manuel to govern in his absence. In the meantime Murad extended his power into Asia Minor, and annexed Phrygia to his dominions; whilst his general Karatino conquered a great part of Albania, sending an immense number of women and children across the Straits of Gallipoli as slaves into Asia. Lazarus, prince of Servia, alarmed at the progress of the Ottomans, formed a league with the Hungarians, Dalmatians, and other neighbouring nations, and led his troops in person against Murad, who met him in the plains of Cassovia. A fearful battle took place, A.D. 1389, in which the Turks had the advantage, and totally defeated the Christians. Lazarus himself was taken prisoner. Murad, while inspecting the field of battle after the fight was over, received a deadly blow from a wounded Albanian who was lying on the ground near him. The Turkish soldiers, in revenge, massacred all the prisoners, including the prince of Servia. Murad himself died in a few hours, after a reign of thirty years, and was succeeded by his son Bayazid. He was a strict observer of the religion of the Korân, severe but just, and simple in his dress and habits. His body was interred with those of his ancestors, at Brusa in Bithynia.

MURAD II., son of Mahomet I., succeeded his father A.D. 1421, being then twenty-two years of age. An impostor had made his appearance in his father's lifetime, pretending to be Mustapha, Bayazid's eldest son, who had fallen in the battle of Angora, in 1401, against Tamerlane. The Greek emperor, pretending to believe him, protected him against the wrath of Mahomot; and, after the death of the latter, actually entered into a treaty with him, and acknowledged him as sultan. Murad was then at Brusa. The pretended Mustapha established his court at Adrianople, and was acknowledged by several pashas and other officers. The first army which Murad sent against him was defeated; but Murad soon after took the field in person, and being assisted by the Genoese, who furnished him with vessels to carry his army across the Straits of Gallipoli, he defeated the troops of Mustapha, took Adrianople, and, having seized the pretender, had him hanged, A.D. 1422. Murad then turned against Manuel, ravaged Macedonia and Thracia, and threatened Constantinople; but Manuel succeeded in stirring up another insurrection in Asia, in favour of another Mustapha, Murad's younger brother. Murad was obliged to leave Europe to quell the insurrection, and soon after the Greek emperor died, A.D. 1424, leaving to his successor, John Palæologus II., the broken remains of his empire. Murad dispersed the insurgents at Nicæa, and had his two brothers strangled, in order to take away all pretext for further insurrections. On his return to Europe, he obliged John Palæologus to pay him tribute. Meantime the Venetians had taken possession of Thessalonica with the consent of the inhabitants. Murad laid siege to it, and took it, after a long resistance, in 1429, when the town was sacked, and all the surviving inhabitants were carried into slavery. Murad afterwards marched against Servia, although one of his wives was Mary, sister of George, the despotos or prince of that country. He took Semendria, and obliged George to take refuge at the court of Ladislaus, king of Hungary and Poland, to whom he gave up the stronghold of Belgrade. The gallant Hunnyades, at the head of the Hungarians, having defeated the Turks, Murad entered into a truce of ten years with Ladislaus, who swore to observe it faithfully; but being encouraged by the Venetians, by the woywode of Valachia, and by the pope himself, Eugenius IV., who sent him Cardinal Julian Cesarini to quiet his scruples, by telling him that an oath taken to an unbeliever was not binding, Ladislaus broke the truce, and advanced with a large army of Hungarians, Poles, Valachians, and others, to Varna, where he was met by Murad. A desperate battle followed: Hunnyades defeated the left wing of the Turks; but not being supported by the rest, the whole Christian army was cut to pieces, A.D. 1444. Ladislaus himself fell, together with the legate Cesarini.

Murad soon after abdicated the throne in favour of his son Mahomet, then fifteen years old, and retired to Magnesia. But seeing the disorders which broke out in the empire, owing to the youth of his son, he resumed his authority, quelled the incipient anarchy, and turned his arms against Scanderbeg, who however repulsed him at the siege of Croia. He then marched against Hunnyades, whom he defeated with great loss. Murad died of illness at Adrianople, in 1451, after a reign of thirty years. Murad possessed several great qualities, but was sensual and cruel. He was succeeded by Mahomet II.

MURAD III., son of Selim II., succeeded his father in 1575, being then thirty-one years old. In 1578 he began a war against Persia, which lasted till 1590, when peace was made, Persia being obliged to resign to the Turks the towns of Tabriz, Gengo, Shirvan, and Khars, with their territories. In 1592 he sent an army into Hungary, which repulsed the Austrians near Gran, and took the fortress of Raab. But afterwards the Turkish armies met with reverses, and the prince of Transylvania having joined the emperor, and the woywode of Valachia having revolted against the sultan, the Turks lost Orsowa and Silistria, with a vast number of men. In the midst of these disasters, Murad died of the stone, at Constantinople, in January, 1595, and was succeeded by his eldest son Mahomet. Murad was fond of war, and yet never went to the field in person. (Mignot; Knowllys.)

MURAD IV., nephew of sultan Mustapha I., who was deposed, in 1622, by the Janizaries, succeeded his uncle when fourteen years old. The first years of his reign were marked by reverses on the side of Hungary as well as on the frontiers of Persia, the Ottomans being then at war both with the emperor and the shah; but in 1627, sultan Murad being now of age, and having concluded peace with the emperor Ferdinand II., turned all his attention towards Persia, and laid siege to Bagdad, where the Persians had a garrison. Meantime the Janizaries having broken out into insurrection, Murad showed great spirit, and succeeded in restoring obedience. In 1635 he repaired in person to the army against Persia, but was obliged to retire. In 1637, having made great preparations, he again took the field in person, and in the following year captured Bagdad after an obstinate defence, when he ordered the whole population, without distinction of age or sex, to be massacred. In 1639 he returned to Constantinople, and made peace with Persia, Bagdad remaining in the possession of the Turks. In 1640 Murad died of a debauch in drinking, to which he was much addicted. His severity repressed the disorderly spirit of the soldiers, and the rebellions of the pashas during his reign, which was upon the whole a successful one;

but his cruelty and debauchery have marked his character as one of the worst princes of the Ottomans. (Rycault, *Turkish History.*)

MURÆ'NIDÆ, or ANGUI'LLIDÆ, a family of fishes belonging to the section of the Malacopterygii called *Apodes*. These fishes have an elongated and often cylindrical body, covered by a thick and soft skin in which the scales are deeply imbedded and scarcely apparent. They have no cœca, but nearly all are furnished with a natatory bladder. In the first group, which constitutes the great genus Muræna of Linnæus, the opercula are small and enveloped in the skin; the gill-opening is small, and is situated far back, an arrangement which, by more completely protecting the branchiæ, permits these fishes to live a long time out of water: they have no ventral fins.

The species of the genus *Anguilla* are distinguished by the possession of pectoral fins; the dorsal, anal, and caudal fins are united. The dorsal commences at a considerable distance behind the pectorals; the upper jaw is shorter than the lower; the gills opening by a small aperture on each side, situated beneath the pectoral fin. Three (if not four) species of *Anguilla*, or eel, are found in this country—the sharp-nosed eel, the broad-nosed eel, and the snig.

The sharp-nosed eel (*Anguilla acutirostris*, Yarrell) may be distinguished, as its name implies, by its comparatively narrow and sharp muzzle. 'The head is compressed, the top convex, depressed as it slopes forwards; the eyes small, placed immediately over the angle of the mouth; irides reddish-yellow: the jaws very narrow, slightly rounded at the end; the lower jaw the longest; nostrils with two openings on each side, one tubular, the other a single orifice; both jaws furnished with a narrow band of small teeth; gape small; various mucous pores about the mouth and other parts of the head; gill-opening a small aperture immediately before and rather below the origin of the pectoral fin; the scales on the body rather small; dorsal fin extending over more than two-thirds of the whole length of the fish; anal fin occupying more than half of the whole length; both united at the end, forming a tail; the number of rays in the first fins not easily ascertained, from the thickness of the skin; the lateral line exhibits a long series of mucous orifices; vertebræ 113. The vent includes four distinct openings, the most anterior of which leads upwards to the intestine, the posterior to the urinary bladder, in a direction backwards, and one elongated lateral opening on each side communicating with the cavity of the abdomen, as in other bony fishes.' Colour of the upper surface of head and body very dark olive-green; under surface silvery: the colouring however varies somewhat according to the nature of the water in which the animal lives, as in other fishes; in those found in clear streams the colours are bright, whilst those found in muddy waters are dusky.

This species is common in streams, lakes, &c., throughout the country. The eel is said to be averse to cold, and in the autumn migrates down the rivers to reach the warm brackish water, where it passes the winter and deposits its spawn. In the spring the young fry may be seen making their way up the streams, sometimes in immense numbers. Such a desire do the young eels (about three inches in length) appear to have to go up the stream, that their course is not easily stopped. The writer of this has seen a flood-gate, six or seven feet in height, in parts covered with them, and has observed many succeed in passing over this perpendicular barrier, by availing themselves of the trickling water which escaped through the crevices of the wood-work.

Those eels which live in ponds, and cannot therefore migrate, bury themselves in the mud during the winter months. In these cases however they will sometimes leave the water, and, availing themselves of the wet grass during the night, travel considerable distances, in order to reach a stream; they are known also to leave certain ponds, the water of which does not suit them, and to make their way over land to other and more favourable situations.

The question as to whether the eel be an oviparous or viviparous fish has been much discussed; many have imagined that it brought forth its young alive, but there appears to be better grounds for the belief that it is oviparous.

'The London market,' Mr. Yarrell informs us, 'is principally supplied from Holland by Dutch fishermen. There are two companies in Holland, having five vessels each: their vessels are built with a capacious well, in which large quantities of eels are preserved alive till wanted. One or more of these vessels may be constantly seen lying off Billingsgate; the others go to Holland for fresh supplies, each bringing a cargo of 15,000 to 20,000 pounds weight of live eels, for which the Dutch merchant pays a duty of 13*l.* per cargo, for his permission to sell.'

The broad-nosed eel (*Anguilla latirostris*, Yarrell) is not uncommon, and is often found in the same waters as the sharp-nosed species, from which it is readily distinguished by the comparatively greater breadth of its head, and the situation of the eye, which is placed in advance of the angle of the mouth. The body is moreover thicker in proportion to its length, the teeth are more numerous, larger, and stronger; the dorsal fin commences farther back; the dorsal and anal fins are much deeper and thicker. The number of vertebræ is 115.

The snig (*Anguilla mediorostris*, Yarrell) is in some respects intermediate between the common or sharp-nosed species and the broad-nosed eel. The general colour above is olive-green, and beneath yellowish-white. 'In the comparative breadth of the nose, the snig is intermediate in reference to the sharp and broad nosed eels, but rather more resembles that with the sharp nose,' says Mr. Yarrell; 'it has a slight but elongated depression extending from the anterior edge of the upper jaw to the upper and back part of the head; the tubular openings of the nostrils are longer, and the mucous pores about the lips larger and more conspicuous; both jaws rounded at their extremities, the lower one the longest; teeth longer and stronger than in the common sharp-nosed species; gape large; the angle and the posterior edge of the eye on the same vertical line; the pectoral fins, the commencement of the dorsal fin, and the vent, are each placed nearer the head than in either of our freshwater eels.'

Besides the distinguishing characters above pointed out there are others, the most important of which perhaps is the difference observable in the form of the vertebræ—see Yarrell's *History of British Fishes*, where the skulls and adjoining vertebræ of these three species are figured.

The conger eel (*Anguilla conger*, Shaw; *Conger vulgaris*, Le Congre, Cuvier) is readily distinguished from the fresh-water species by the upper jaw being the longest, and the dorsal fin commencing much nearer the head—characters which have induced Cuvier to separate it from them as a subgenus.

This marine species is common on many parts of our coast, and is indeed found in most of the European seas. It attains a very large size, being often five or six feet in length and occasionally as much as ten feet or upwards; the thickness bearing about the same proportion to the length as in the common eel. The upper parts of the body are brownish and the under parts dirty-white; dorsal and anal fins whitish margined with deep bluish-black; the lateral line is spotted with white.

In the Mediterranean another species of conger (the *Anguilla myrus*) is found. It resembles the common species, but is of a smaller size, and is known by there being spots on the snout, a band across the occiput, and two rows of dots on the nape, all of which are of a whitish colour.

Nearly allied to *Anguilla*, is the genus *Ophisurus* of Lacépède, the species of which differ from the true eels by their dorsal and anal fins terminating before they reach the end of the tail, which has no fin. The posterior orifice of the nostrils opens on the edge of the upper lip.

One species inhabits the Mediterranean, the *Ophisurus serpens*; it is about five or six feet in length and about three inches in thickness, of a brown colour above and silvery beneath; the snout is slender and pointed.

In some species of this genus the pectoral fins are very small, and in this respect approach the genus *Muræna*, in which there are no pectorals; their branchial openings are small; the opercula and branchiostegous rays are concealed by the skin.

Many of the species of this genus are beautifully mottled or spotted; several are found in the Mediterranean, and one species, the *Muræna Helena*, L., has been found on the British coast.

Several other genera belonging to the present family,—among which the genus Gymnotus (which contains the electric eel) may be mentioned,—are noticed under their proper heads.

MURAT, JOACHIM, one of the most celebrated of the French imperial marshals, and by Napoleon created king of Naples, was born at a village in Perigord, in 1767. His father was a country innkeeper, who had been a steward to

the great family of the Talleyrands, and through their interest young Joachim was placed at the college of Cahors, and destined for the church; but his disposition and conduct little fitted him for the sacred profession, and an amour led him to discard the ecclesiastical habit and enlist into a regiment of chasseurs, from which he was soon after dismissed for insubordination. Returning to his native village, he took charge of his father's horses until the breaking out of the Revolution, when he obtained his enrolment into the constitutional guard of Louis XVI., from which he passed as sub-lieutenant into a regiment of chasseurs. During the reign of terror he professed himself an enthusiastic champion of liberty and equality, and rose rapidly to the rank of colonel; but his Jacobin predilections did not prevent him from making himself useful to Bonaparte in the affair of the Sections in 1795; and he was rewarded by being placed on the personal staff of the future emperor in his glorious Italian campaign of 1796.

From that hour the fortunes of Murat closely followed those of his patron. The fiery valour which the 'handsome swordsman' (beau sabreur), as he was called, showed in a hundred fights, the splendid though somewhat fantastic costume in which he delighted to figure, and the love of daring achievement which threw an air of antient romance over all his actions, invested him, in the eyes of his admiring fellow-soldiers, with the renown of some paladin of old; and his enterprising talents in the field obtained for him the graver distinction, in the cool judgment of Napoleon himself, of 'the best cavalry officer in Europe.' He commanded that arm in the campaigns of Egypt, Italy, Austria, and Prussia; and in all, at Aboukir, Marengo, Austerlitz, Jena, Eylau, and Friedland, his services were brilliantly conspicuous.

After the Egyptian campaign, he obtained the hand of Caroline, youngest sister of Napoleon; and in 1806 was raised to the dignity of a sovereign prince, and recognised by the continental powers as grand-duke of Berg and Cleves.

In 1808 he commanded the French army in Napoleon's unprincipled invasion of Spain; from which country he was recalled and sent to Naples to ascend the throne of that kingdom, vacated by the elevation of Joseph Bonaparte to the Spanish crown. In 1812 he accompanied Napoleon on the expedition to Russia, in the command of the cavalry of the grand army—the most numerous and splendid body of horse perhaps which the world has ever seen arrayed in the ages of civilised warfare. During the advance to Moscow, Murat displayed his accustomed prodigies of personal valour; but the reverses of the retreat disgusted him; reproaches which passed between Napoleon and himself aggravated the recollection of some former slights and wrongs of which he deemed that his brother-in-law had been guilty to him; and although he again served the emperor in the campaign of 1813, he finally, after the disastrous battle of Leipzig, deserted his waning fortunes, and allied himself with his enemies. By this defection he for a time saved his own throne; but the delay of the Congress of Vienna to recognise his regal title alarmed his suspicions, and hurried him, on the re-appearance of Napoleon in France, in 1815, into hostilities against the allied powers. In an attempt to induce the Italians to arm for their national independence, he signally failed; he was compelled to flee from his kingdom; and desperately landing again in arms on the coast of Calabria with a few followers, he was captured, and shot by the base sentence of a Neapolitan court-martial. As a sovereign Murat had shown himself mild, liberal, and merciful; as a politician he was weak, vacillating, and faithless; in the field the 'best cavalry officer in Europe' was assuredly no general; as a man he had many warm and noble feelings; but of fixed principle, either in private or public life, he was utterly destitute.

MURATO'RI, LUDOVI'CO ANTONIO, born in 1672, at Vignola, the birth-place of the architect Barocci, in the Modenese territory, studied at Modena, and showed an early aptitude for historical and philological studies. He entered holy orders, and at the age of three-and-twenty he was appointed one of the librarians of the Ambrosian library at Milan. In that collection he discovered several inedited MSS., from which he made extracts, which he published with notes and comments, under the titles of 'Anecdota Latina,' and 'Anecdota Græca.' Some years after he was recalled to Modena by the duke Rinaldo, who gave him the situation of librarian of the rich library of the house of Este, a place which he retained for the rest of his life.

After this appointment Muratori devoted himself entirely to the study of the Italian records of the middle ages; and after many years of assiduous labour he produced his great work, 'Rerum Italicarum Scriptores, ab anno æræ Christianæ quingentesimo ad millesimum quingentesimum,' 28 vols. fol. The first volume of this immense collection was published in 1723, and the last appeared in 1751. Several princes and noblemen defrayed the expenses of the publication; sixteen of them contributed 4000 dollars each. In this collection Muratori has inserted all the chronicles of Italy during the middle ages which he could discover, most of which were inedited, and has accompanied them with valuable commentaries. Some of the texts had been already published by Grævius, in his 'Thesaurus Antiquitatum et Historiarum Italiæ,' but they were mostly confined to the last century or two of the period of a thousand years embraced by Muratori. In seeking after the historical records of the middle ages, Muratori collected also a vast number of documents concerning the social, civil, intellectual, and political condition of Italy during that long period, which he transcribed and commented upon, and he published the whole in seventy-five dissertations: 'Antiquitates Italicæ medii ævi, sive Dissertationes de moribus Italici populi, ab inclinatione Romani Imperii usque ad annum 1500,' 6 vols. fol., 1738-42. 'I have treated first,' says the author in his preface, 'of the kings, dukes, marquises, counts, and other magistrates of the Italian kingdom; after which I have investigated the various forms of the political government, and also the manners of the private citizens; the freedom and franchises of some classes and the servitude of others; the laws, the judicial forms, the military system; the arts, sciences, and education; the progress of trade and industry; and other matters of social and civil history.'

Muratori has been truly called the 'Father of the history of the middle ages.' Subsequent historians, such as Sismondi and others, are greatly indebted to Muratori, without whose previous labours they could not have undertaken or completed their works. Muratori wrote an abridgement of his Dissertations in Italian, which was published after his death: 'Dissertazioni sopra le Antichità Italiane,' 3 vols. 4to., 1766. He also wrote in Italian, 'Annali d'Italia dal principio dell' era volgare sino all' anno 1750,' 12 vols. 4to., 1762. It is the first general history of Italy that was published, and is a useful book of reference. It has been continued by Coppi down to our own times: 'Annali d'Italia in continuazione di quelli del Muratori, dal 1750 al 1819, 4 vols. 8vo., Rome, 1829. Another work of Muratori is his 'Novus Thesaurus veterum Inscriptionum,' 4 vols. fol., 1739, in which he has inserted many inscriptions unknown to Gruter, Spon, Fabretti, and other archæologists who had preceded him.

His work entitled 'Antichità Estensi,' in 2 vols. fol., Modena, 1710-40, is the Fasti of the house of Este in its various branches. He also wrote several historico-political treatises in support of the rights of his sovereign the duke of Modena over the towns of Ferrara and Comacchio, which had been seized by the court of Rome: 'Questioni Comacchiesi,' Modena, 1711; "Piena esposizione dei Diritti della Casa d'Este sopra la Citta di Comacchio, 1712; 'Ragioni della serenissima Casa d'Este sopra Ferrara,' 1714.

Among Muratori's other works we must mention—1, 'Governo politico, medico, ed ecclesiastico della Peste,' 1720, written on the occasion of the plague of Marseille, and showing the methods required to counteract it. 2, 'Difetti della Giurisprudenza,' 1742, in which he shows the defects of judicial forms in most countries. 3, 'Morale Filosofia,' 1735. 4, 'Istituzioni di pubblica felicità, 1749. 5, 'Della regolata divozione dei Fedeli.' In this last treatise, Muratori, who, though sincerely pious, was too enlightened to be superstitious, combated several popular devotional practices which were merely external, and recommended in preference internal habits of self-examination and prayer. His enemies accused him of heresy. Muratori wrote to the pope Benedict XIV., to explain his meaning and ask for his judgment on the matter of contention. That enlightened pontiff wrote him a kind letter in answer, telling him that 'those passages in his works which were not found acceptable to Rome did not touch either the dogma or the discipline of the church; but that had they been written by any other person the Roman congregation of the Index would have forbidden them; which however had not been

done in the case of Muratori's works, because it was well known that he, the pope, shared in the universal esteem in which his merit was held,' &c.

The character of Muratori is clearly seen in his works. Modest though learned, indefatigable, intent upon the improvement of mankind, charitable and tolerant, sincerely religious and strictly moral, he was one of the most distinguished and yet most unobtrusive among the learned of Italy.

He was rector of the parish of Pomposa at Modena, but his literary occupations did not make him neglect his flock: he assisted his parishioners with his advice and his money; he founded several charitable institutions, and rebuilt the parish church. He died at Modena, in 1750. His minor works were collected and published at Arezzo, in 1787, in 19 vols. 4to. His tomb is in the church of S. Agostino at Modena, near that of his illustrious countryman Sigonio.

MURAVIEV, MIKHAEL NIKITITCH, a Russian author of some distinction, was born at Smolensk, October 15-27, 1757. His literary acquirements and talents obtained for him the notice of Catherine the Great, by whom he was appointed, in 1785, preceptor to the young grand-dukes Alexander (afterwards Alexander I.) and Constantine; and it was for the instruction of his imperial pupils that he wrote the greater portion of his prose works, consisting of historical and moral pieces, among which are his 'Epochs of the Russian Empire,' and 'Geographical Sketches of North and South Russia.' His 'Dialogues of the Dead' are also intended to characterise the more remarkable personages of Russian history, and are therefore altogether in a different spirit from those of Lucian, Fontenelle, and their imitators, who employed that form of composition chiefly as the vehicle of satire. One of his most admired productions is his 'Oskold,' which describes the march of the northern nations against Constantinople, and which, though in itself a mere fragment, proves its author to have possessed talents capable of giving his countrymen a prose epic. To these productions, all of which are distinguished by great correctness and energy of style, and no less by the moral feeling which pervades them, may be added his 'Letters of Emilius,' and a series of reflections or sketches, entitled 'The Solitary of the Suburb.' His poetical compositions are of less importance; for though admired in their day, they now possess little interest. Muraviev died June 29 (11th July), 1807, and his historical pieces were collected and edited by Karamzin in 1810. The first complete edition of his works appeared in three large volumes 8vo., 1829, to which is prefixed a biographical and critical sketch, written by his nephew and pupil, Constantine Batiushkov, the distinguished poet.

MURCHISONITE, a variety of moon-stone or felspar. Occurs in crystals and in crystalline masses; primary form an oblique rhombic prism. Fracture uneven. Hardness 5·5, 6·0. Transparent. Opaque. Colour white, with a slight red tint. Specific gravity 2·509. Occurs in the new red-sandstone near Exeter.

Analysis by Phillips—

Silica	68·6
Potash	14·8
Alumina	16·6
	100·

MU'RCIA, a province or kingdom of Spain, situated between 37° 10′ and 39° 10′ N. lat. and 50′ and 3° 5′ W. long. It is bounded on the north by the province of Cuenca in New Castille, on the north-west by the province of La Mancha, on the west by the kingdoms of Jaen and Granada in Andalucia, on the east by that of Valencia, and on the south by the Mediterranean. It is about 120 miles long from north to south, and 110 in extreme breadth from east to west. Its area is 5931 square miles. Its population is computed at more than 490,000.

The province is divided into nine *partidos*, or districts, viz. those of Murcia, Cartagena, Lorca, Chinchilla, Villena, Cieza, Hellin, Albacete, and Segura de la Sierra, each of which has a capital town of the same name. The province contains 212 cities, towns, and villages, one bishopric, six military commanderies, 91 religious houses, 12 hospitals, four hospices, eight colleges, and two seaports, Cartagena and Las Aguilas, the former being one of the grand depôts of the marine. In military matters the province is subject to the captain-general of Valencia; in civil and criminal, to the chancery of Granada. The annual returns to the royal exchequer amount on the average to 3,581 250 *reales*, or about 38,000*l.* sterling.

The province is intersected by numerous ranges of mountains, which are separated by extensive valleys and plains. The principal chains are the sierras of Pinoso and Losillas in the west, those of Orihuela and Monteagudo in the east, those of Chinchilla and Almansa in the north, and that of Carrascoi in the south-east. Those of Tercia, Espuña, Muella, and Castellar intersect the province from south-west to north-east. The sierra of Espuña is the loftiest in Murcia.

The soil is generally parched for want of water, the only rivers being the Segura and its tributaries the Mundo, Taivilla, Moratalla, Caravaca, Quipar, and Sangonera; the valleys in which these rivers flow are in general very fertile, particularly that called the Huerta or Garden of Murcia, but the unwatered low lands are arid and sterile as the desert, and these, with the mountains, which are mostly bare and uncultivated, cover two-thirds of the surface of the province. Both mountains and plains however yield in parts excellent pasturage.

The coast between Cartagena and the kingdom of Granada presents a series of steep and lofty cliffs; eastward from that port it is low and sandy; the whole coast is studded with watch-towers at intervals.

The climate of Murcia is varied; temperate and delightful on the sea-coast and among the mountains, but intensely hot in the plains. Storms are not unfrequent in the spring; the summers are exceedingly hot, the mercury often rising above 100° Fahr. in the shade; the autumns are delightful, and the winters are so mild that ice and snow are almost unknown, and the foliage is always green. Clouds and fogs are rare, and the sky is throughout the year so blue and bright as to have gained for Murcia the title of 'the most serene kingdom.' But on the other hand rain is very scarce; in some parts a whole year will elapse without the fall of a shower.

Of the geology of this province little is known: the mountains are principally of limestone; the Sierra de Segura in the west is one mass of grey and white limestone; in the vale of Segura greenstone is found; trachyte and other volcanic rocks at Almazarron on the coast, where is also an aluminous rock, which is quarried. The chain between Murcia and Cartagena is of sandstone, with marl, lignite, and gypsum; the latter is also found in great quantities on the chalky range to the east of the city of Murcia. Porphyry, primary slates and schist, fine marbles, rock-crystal, freestone, bole, and nitre are found in various parts of the province. Near Hellin is a mine of sulphur, at Villena a saltpit, and saltpetre abounds in the neighbourhood of Cartagena. There are several lead-mines in the province, and report says that there are veins of silver and copper, but they are not worked; there are also some hot-springs and cold mineral waters.

The vegetable productions are wheat, of which the ordinary harvest amounts to 701,923 *fanegas*, or about 1,081,086 bushels, but in rainy seasons to nearly double that quantity; barley, rye, rice, maize, vegetables, and fruit of superior quality, particularly oranges, lemons, melons, and pomegranates. The most common trees are the mulberry and the olive; evergreen and other oaks, poplars, and carobs are in some parts numerous. The pines on the Sierra de Segura form the largest forest in the south of Spain. The nerium oleander, cistus, tamarisk, passerina hirsuta, prickly pear, chamærops humilis, and American aloe grow wild and luxuriantly. Hemp, flax, and sugar-canes are of superior quality, but little cultivated. Great quantities of barilla are produced on the sea-coast; silk and oil are also extensively produced, with some saffron and wine. The *esparto* rush grows most luxuriantly in the neighbourhood of Cartagena, as in the time of the Romans, who, on this account, gave that city the name of Carthago Spartaria.

Cattle are not numerous in Murcia; they are principally sheep and goats, horned cattle being rare; the pigs are very fine. Game is found in vast quantities; fish is abundant on the coast. Wolves, foxes, and wild boars inhabit the mountains.

Of manufactures there are very few, and of none enough to supply the consumption of the province. The principal are silk, which is wrought into ribands, taffetas, and velvets, all of inferior quality; knives and other cutlery are made at Albacete, a small quantity of soap at Villena and Murcia, and a little earthenware, with some saltpetre and gunpowder

at the latter city; the manufactures of coarse linen, brandies, hemp, and flax are very insignificant.

Commerce in Murcia is at a very low ebb, owing to the indolence of the inhabitants in agriculture and manufactures. If the wretched state of the roads did not prevent much intercourse with the rest of Spain, the port of Cartagena, which is esteemed the best in the country, would probably be made the outlet for the exports of the inland provinces. The other seaport, that of Las Aguilas, a small town built by Charles III., is now falling into decay. Near the confines of Valencia is a singular land-locked bay, ten miles long by three broad, called La Encañizada de Murcia, but it is adapted only to very small vessels. Corn and wine are exported when the harvest or vintage is good, otherwise they are imported from Valencia; the wine is sent to Madrid, and its average value (according to Laborde) was, at the close of the last century, 32,000*l.* sterling. Silk to the amount of 230,000*l.* is exported to Estremadura and New Castille; of barilla, above 100,000*l.* to foreign countries; of cutlery 5000*l.*, and of saffron 4700*l.* to Valencia, New Castille, and La Mancha; and of articles made of the esparto-rush, 4000*l.* to Madrid and other parts of New Castille.

Murcia imports fruit and vegetables from Valencia; beef and mutton, oil, spices, ironware, linen and woollen goods, and many silk stuffs, for there is not industry enough in the province to manufacture the raw produce.

The principal towns in this province are, Murcia, the capital; Cartagena [CARTAGENA;] Lorca [LORCA]; Chinchilla, with 13,000 inhabitants; Albacete, with 11,500; Villena, with 9500; Hellin, with 8000; Cieza, with 6500; Almanza, the Almantica of the Romans, with 6000; Segura de la Sierra, with 4000; Jumilla, with 8000, celebrated for the battle fought in its neighbourhood in 1707, which secured the crown of Spain to Philip V., the first of the Bourbon dynasty; Tutana, with 12,000; Alhama, with 4000, renowned for its baths and hot-springs; and Molina, with 3000 inhabitants.

The Murciano is tall and well-made, with good features but a sallow livid complexion, and very African in appearance. His leading characteristic is sloth, for he is pre-eminently the sluggard of Spain, and spends the greater part of his time in sleep or smoking. He is gloomy and morose in disposition, yet very choleric, litigious, and revengeful; suspicious and frugal, and therefore not fond of society or amusements; bigoted to old customs, and profoundly ignorant. The women are said to be mild and amiable, and less attentive to dress than most of their countrywomen. They wear the national costume—the *basquiña* and *mantilla*. The peasantry wear close-fitting caps, white jackets, loose and short linen drawers girt round the middle with red woollen sashes, sandals of esparto rush; and long narrow plaids of striped wool. The language of Murcia is Castillian, corrupted by Arabic and Valencian.

Murcia was the part of Spain first colonised by the Carthaginians, who, about B.C. 202, founded New Carthage, now Cartagena. It passed, with the rest of the peninsula, under the dominion of the Romans and Goths; from the latter it was conquered, A.D. 552, by Justinian, emperor of the East, and it remained in the hands of the Greeks till 624, when it was recovered by the Gothic king Suintilha. In 712 it was conquered by Abdalazis, son of Muza, the Arab invader of Spain. It continued subject to the khalifs of Cordoba till A.D. 1144, when, after the disruption of that khalifate, it fell under the dominion of the kings of Granada; but in 1221 was re-annexed to Cordoba. In 1239 it was raised into a distinct kingdom by Hudiel, who the following year submitted to Ferdinand the Saint, king of Castille, consenting to pay tribute on condition of being allowed to retain the crown for life. In 1264 he endeavoured to regain his independence, but was conquered and dethroned in 1266 by Alonso X. of Castille and James I. of Aragon. Murcia has ever since remained in the hands of the Christians, and now forms one of the kingdoms of Spain.

(Miñano, *Diccionario Geografico-Estadistico de España y Portugal*; Laborde, *Itinéraire Descriptif de l'Espagne*; Townsend's *Journey through Spain*; Cook's *Sketches in Spain*; Mariana, *Historia General de España*; Conde, *Los Arabes en España*.)

MURCIA, a city of Spain, the capital of the province of that name, lies in 38° 2′ N. lat. and 1° 14′ W. long. It is distant 228 miles from Madrid, 36 from Cartagena, and 48 from Lorca, and is situated in a valley on the left bank of the river Segura. This valley is called the Huerta or Garden of Murcia; 'in beauty,' says Townsend, 'it exceeds everything I had seen in Spain.' Its soil is a rich loam well watered by means of Moorish reservoirs and water-courses: and in fertility it yields to no part of the Peninsula. Mulberries, olives and corn, hemp and flax, are its chief produce, but with these are mingled groves of fig and orange trees and clusters of date-palms. Though in length only 24 miles, and in breadth 5 or 6, it is said to contain more than a third part of the population of the whole province.

The city of Murcia is first mentioned in history under the name of D'Orcola, just before the invasion of the Arabs, by whom it was besieged and taken, A.D. 714. It continued subject to the khalifate of Cordoba till 1144, when it was annexed to the kingdom of Granada; but in 1221 it became again subject to Cordoba, and in 1239 it was made the capital of a distinct kingdom by Hudiel, who the next year submitted to be tributary to Ferdinand the Saint, king of Castille. In 1264 he revolted, and was conquered by Alonso X. of Castille, in 1266; since which time Murcia has remained in the hands of the Christians.

Murcia at the present day contains about 35,000 inhabitants. It is the see of a bishop, suffragan of Toledo, whose diocese comprehends almost the whole of the province. The principal buildings are the cathedral, 10 other parish-churches, 21 convents, 12 for monks and 9 for nuns (suppressed in 1835), 5 colleges, a casa de misericordia, or hospital, the bishop's palace, the town-hall, the granary, the custom-house, and a house for the public weighing of silk. It has also 33 schools, 2 public libraries, 16 *posadas* or inns, and several manufactories. The cathedral is of freestone and marble, very spacious, richly decorated externally, but heavy and gloomy within. The lofty square tower attached to it is ascended by a spiral slope without steps.

Murcia was formerly fortified, but is now open on every side. Four of its antient gates however remain. The streets are narrow, crooked, and irregular, but clean; the handsomest is that of La Traperia. The houses are mean; some of the most antient have fronts decorated with grotesque sculpture of bad workmanship; many have gardens attached, filled with orange or palm trees. There are many squares; the principal are those of Santa Olalla, Del Esparto, San Domingo, Santa Maria, and Los Toros, where the bullfights are held. A handsome bridge of two arches connects the city with the suburb of San Benito on the right bank of the Segura. Along the left bank is a promenade with handsome houses. Three other well-shaded promenades are in the vicinity of the city, but they are little frequented by the citizens.

The commerce and manufactures of the city are very inconsiderable, yet it is the centre of the industry of the province. It has 5 potteries, 10 factories of cloth, 1 of soap, 1 of white-lead, 6 tanneries, 2 oil-mills, 6 establishments for the spinning of silk, and 1 of wool; the manufacture of silk once employed 16,000 hands, but now only 400. There is also a royal factory of gunpowder, producing 800,000 lbs. per annum, and one of saltpetre, producing yearly 30,000 lbs., though formerly not less than 250,000 lbs. The manufacture of the esparto rush into baskets, cordage, sandals, &c., gives employment to many hands. Provisions are exceedingly cheap at Murcia. Beef and mutton sell at about 3*d.* per lb., veal rather above and pork rather below that sum. Good wine, about 2½*d.* the bottle. The price of daily labour is from 10*d.* to 1*s.* The average returns to the exchequer amount to more than 15,000*l.* sterling per annum.

The citizens in character do not differ from the other inhabitants of the province; they are equally slothful, gloomy, and reserved, and little addicted to pleasure; on this account Murcia is one of the dullest cities in Spain.

Murcia has given birth to few great men. Schamseddin, a learned man among the Spanish Arabs, was born here many centuries since; and except a few poets, painters, sculptors, and authors of no great celebrity, the only other distinguished citizen of whom Murcia can boast is the Count Florida Blanca, prime minister of Spain, who died in 1792.

(Laborde, *Itin. Descrip. de l'Espagne*; Townsend's *Journey through Spain*; Mariana, *Hist. de España*; Conde, *Hist. de los Arabes en España*; Miñano, *Diccionario Geografico Estadistico de España*; Inglis's *Spain in* 1830; Cook's *Sketches in Spain*.)

MURDER. In the earlier periods of English jurisprudence, murder, *murdrum*, was a term used to describe the

secret destruction of life, witnessed and known by none besides the slayer and any accomplices that he might have; so that the hue and cry, which the law required to be made after malefactors, could not be raised.

Murdrum was also the name of an amercement or pecuniary penalty imposed, until the reign of Edward III., upon the county or district in which such a secret killing had taken place. One of the modes of escaping from this penalty was, a presentment of Englishry; in other words, a finding by the coroner's inquest, upon the statement of the relations of the deceased, that he was an Englishman; the sole object of the amercement having been the protection of Danes, and afterwards of the Normans, from assassination by the English. (Glanville; Reeves.)

By the grant of 'murdra,' which is commonly found in antient charters of franchises, the right to receive these amercements within the particular districts, passed from the crown to the grantee. Amercements for non-presentment of Englishry were abolished in 1340, by 14 Edw. III., st. 1, c. 4.

As the law formerly stood, every destruction of human life, not effected in this secret manner, with whatever circumstances of malignity and cruelty it might be accomplished, was treated as simple homicide. The law appears to have been gradually altered by the judges, in order to reach atrocious criminals whose offences would not formerly have been punishable as murder. As the law now stands, murder is the destruction of human life, accompanied with an intention on the part of the perpetrator of the offence to kill or do great bodily harm, or wilfully to place human life in peril; or resulting from an attempt to commit some other felony; or occurring in the course of resistance offered to ministers or officers of justice, or others rightfully engaged in carrying the law into execution. All other cases of culpable homicide, in which death is produced involuntarily, but is occasioned by want of due caution; or where, though death is produced voluntarily, the crime is extenuated by circumstances; or where a minister or officer of justice is killed, but sufficient authority did not exist, or was not communicated to the party before the fatal blow was given; or where any other circumstances essential to the crime of murder are wanting—amount only to simple felonious homicide, or, as it is commonly called, without regard to the age or sex of the party killed, manslaughter.

The law recognises the right of taking away life in the necessary defence of person or property, and it admits, in some cases, previous provocation as an extenuation of the offence. On the other hand, it makes special provision for the protection of officers and ministers of justice, where the killing of such officer or minister, though culpable, does not under the circumstances amount to murder.

In the modern law of England the crime of murder is characterised by having been committed with malice aforethought, or, as it is sometimes called, malice *prepense*; which term, though in its ordinary signification it imports premeditation, has been extended to cases not only where the offender acts from a motive of ill-will towards another, with an express intention to destroy or injure him, but also where, without the existence of express malice, it is considered necessary, on grounds of policy, to punish homicide with the highest degree of severity.

The term 'malice aforethought' is therefore frequently applied to a state of things in which no malice is felt in the ordinary sense of the term, but is only malice in a legal sense, by construction of law.

If A shoots at B with intent to kill him, but by mere accident kills C, this is a killing from implied malice. If A, by throwing a heavy stone from the roof of a house into the street in which he knows that people are continually passing, kills B, a mere stranger, this also is a killing from implied malice.

Implied malice is however very loosely defined in the law of England, if it can be said to be defined at all. It is stated, that the existence of implied malice is a pure question of law, or a conclusion of law to be drawn from all the circumstances of the case; and it is in some cases made to depend upon a very abstruse technical doctrine. The existence or non-existence of a criminal intention, even where that intention has no reference to any personal injury, but happens to be accompanied with a killing which is altogether accidental, is made to constitute the distinction between the higher and lower species of culpable homicide; and in other cases the existence of such criminal intention brings even an accidental killing within the scope of manslaughter.

Mr. Justice Foster says, 'When the law maketh use of the term "malice aforethought," as descriptive of the crime of murder, it is not to be understood in that narrow restrained sense to which the modern use of the term "malice" is apt to lead one, a principle of malevolence to particulars; for the law, by the term "malice" in this instance, meaneth, that the fact hath been attended with such circumstances as are the ordinary symptoms of a wicked, depraved, and malignant spirit. The malus animus, which is to be collected from all circumstances, and of which the court, and not the jury, is to judge, is what bringeth the offender within the denomination of wilful malicious murder. And I believe most, if not all the cases which in our books are ranged under the head of implied malice, will, if carefully adverted to, be found to turn upon this single point—that the fact hath been attended with such circumstances as carry in them plain indications of a heart regardless of social duty and fatally bent upon mischief.' (*Discourse on Homicide*, 256, 257.)

This vague and figurative description of that which is propounded as a legal definition appears to furnish us with no certain test of the crime of murder. It amounts to no more than this: that, to constitute the crime of murder, the act must have been attended with such circumstances as in the opinion of the court, and not of the jury, are 'the ordinary symptoms of a wicked, depraved, and malignant spirit,' of 'a heart regardless of social duty, and fatally bent upon mischief.' It is a description of that which is rather matter of fact than of law. The question in each particular case is, whether the party acted in wanton and wicked disregard of the probable consequences of an act tending to the destruction of human life; which is an inference to be deduced from the evidence, and in arriving at which no assistance can be derived from the application of mere technical rules. The presence of that evil-disposition of the mind of the offender which makes the offence murder, is known only by evidence of an act or omission by which human life is wilfully or wantonly exposed to peril.

Every homicide is presumed to be malicious until the contrary be shown. But upon the investigation, circumstances may transpire which extenuate the offence, and reduce it from the crime of murder to that of manslaughter; or the act may appear to amount either to justifiable or excusable homicide. In cases of justifiable homicide, and, according to modern practice, in cases of excusable homicide, the party causing the death is discharged from responsibility.

To constitute legal homicide, the death must result from injury to the *person* (as contradistinguished from causes operating upon the *mind*) occasioned by some act done by, or some unlawful omission chargeable upon, the party to whom such homicide is imputed. The terms 'wilful omission' apply to every case of noncompliance with a legal obligation which the party may be under, to supply food, clothing, or to furnish any other assistance, or to do any other act, for the support of life or for the prevention of injury to it. It is not homicide unless death take place within a year and a day after the injury; or, in other words, it is not considered homicide when the party injured survives a whole year, exclusive both of the day of the injury and of the day of the death; nor where the death is to be attributed to unskilful treatment, or other cause not resulting from or aggravated by the injury sustained.

The law of homicide applies to the killing of aliens, except alien enemies slain in the heat and in the exercise of war; to felons, except when executed according to law; and to persons outlawed, whether on civil or on criminal process. But a child *in venter sa mere* (in its mother's womb) is not a subject of homicide, unless, subsequently to the injury, it be born alive, and die, within a year and a day from its birth, from the injury received whilst yet unborn. [INFANTICIDE.]

Criminal homicide is one of three kinds, murder, manslaughter, and self-murder. [SUICIDE.]

I. Murder is committed by:—

1. Voluntary homicide, without circumstances of justification, excuse, or extenuation.
2. Involuntary homicide, resulting from the commission of a felony, or from an attempt to commit felony.

3. Homicide, whether voluntary or involuntary, committed in unlawfully resisting officers or ministers of the law, or other persons lawfully acting for the advancement or in the execution of the law.

II. Manslaughter consists in:—

1. Voluntary but extenuated homicide, committed in a state of provocation, arising from a sufficient cause.
2. Involuntary homicide, not excused as being occasioned by mere misadventure.

This second class may be subdivided into:—

1. Involuntary homicide, resulting from some act done, or from the wilful omission to do some act, with intent to occasion bodily harm.
2. Involuntary homicide, resulting from some wrongful act done to the person.
3. Involuntary homicide, in committing, or in attempting to commit, an offence attended with risk of injury to the person.
4. Involuntary homicide, resulting from some act done without due caution, or from the unlawful omission to do some act.

Homicide not criminal is:—

1. Justifiable, as done for the advancement or in the execution of the law; or
2. Excusable, as done for the defence of person or property; or because it has, without the fault of the party, become necessary for his preservation.

The offence is extenuated where the act, being done under the influence of excitement from sudden provocation, or of fear, or of alarm, which may, for the time, suspend or weaken the power of judgment and self-control, is attributable to transport of passion or defect of judgment so occasioned, without any deliberate intention to kill or do great bodily harm; regard still being had to the nature and extent of violence used by the party inflicting the injury which causes death, as compared with the cause of provocation. The offence is not extenuated where, the cause of provocation being but slight, a return is made so excessive and disproportionate, that the killing cannot be attributed to mere heat of blood arising from the provocation given.

Homicide is neither justified nor extenuated by reason of any consent given by the party killed, as in cases of duels.

Homicide is justifiable, where the act is done in a lawful manner, by an officer or other person lawfully authorised, in execution of the sentence of a court of competent jurisdiction.

Homicide is justifiable, where an officer of justice, or other person duly authorised to arrest, detain, or imprison for any felony or for any dangerous wound given, and using lawful means for the purpose, cannot, otherwise than by killing, overtake the party in case of flight, or prevent his escape from justice; provided the officer knew, or had reason to believe, that the party attempting to escape was aware that he was pursued for such felony or wound given.

Also, where any officer of justice, or other person lawfully executing in a lawful manner any civil or criminal process, or other authority for the advancement of the law, or interposing in a lawful manner for the prevention or suppression of any breach of the peace or other offence, is unlawfully and forcibly resisted, and using no more force than is necessary to overcome such resistance, happens to kill the party resisting; or being, by reason of the violence opposed to him, under reasonable fear of death if he proceed to execute his duty, and because he cannot otherwise both execute his duty and preserve his life, kills him who so resists—in either of these cases the homicide is justifiable.

Homicide is also justifiable, when necessary for preventing the perpetration of any felony attempted to be committed by violence or surprise against person, habitation, or property; and where one, in defence of movable property in his lawful possession, using no more force than is necessary for the defence of such property against wrong, happens to kill the assailant; or being, from the violence of the assailant, under a reasonable and *bonâ fide* apprehension that he cannot otherwise both defend his property and preserve his life, kills the assailant; also where one in lawful possession of house or land, after requesting another, who has no right to be there, to depart, is resisted, and using no more force than is necessary to remove such wrong-doer and retain his possession, happens to kill such wrong-doer; or being, from the violence with which such wrong-doer endeavours to deprive him of possession, under reasonable and *bonâ fide* apprehension that he cannot otherwise both maintain possession and preserve his life, kills such wrong-doer.

Homicide is excusable, when a man is involuntarily placed in such a situation that he is under the necessity of killing another in order to save his own life; as where, in a shipwreck, A pushes B from a plank which can save one only.

Homicide is not criminal, when it occurs in the practice of any lawful sport or exercise with weapons not of a deadly nature, and without intent to do bodily harm, and where no unfair advantage is intended or taken. But it amounts to manslaughter where weapons are used, the use of which is attended with probable danger; or where, in case of friendly contest, without the use of such weapons, death results from any unfair advantage taken, either as regards the nature of the instrument, the mode of using it, the want of due warning given previously to violence used, or from any want of due caution. Tournaments, though a sport in which deadly weapons were used, yet, being considered a useful training to arms, were lawful if held with the consent of the king. In case of death therefore, in the course of one of these exhibitions, the criminality of the act appears to have depended upon the royal licence for the holding of the tournament. [TOURNAMENT.]

The statute of 9 Geo. IV., c. 31, s. 3, enacts, that every person convicted of murder, or of being accessory before the fact to murder, shall suffer death; and that every accessory after the fact to murder, shall be liable, at the discretion of the court, to be transported for life, or to be imprisoned, with or without hard labour, for any term not exceeding four years. By an act passed in 1752 (25 Geo. II., cap. 37), the bodies of persons executed for murder were directed to be delivered to surgeons to be dissected, or to be hanged in chains. The 2 & 3 W. IV., c. 75, required that such persons should be hung in chains, or buried within the precincts of the prison. The 4 & 5 W. IV., c. 36, s. 1, has taken away one part of the alternative, and the mode of burial is the only circumstance which distinguishes sentences upon a conviction for murder from those pronounced in other capital cases. Formerly the murder of a bishop, abbot, or prior, by a person owing him canonical obedience, of a master or mistress by a servant, or of a husband by his wife, was denominated petty treason, and punished with greater severity than other murders. The party was drawn to the place of execution; and if the offender was a woman, burning was, as in the case of high treason, substituted for hanging; but by the 9 Geo. IV., c. 31, s. 2, petty treason is to be treated as murder only.

The offence of manslaughter is punishable with transportation for life, or for not less than seven years, or with imprisonment, with or without hard labour, not exceeding four years, with fine, by 9 Geo. IV., c. 31, s. 9. (Foster; East; *Fourth Report of Criminal-Law Commissioners.*)

MURE, SIR WILLIAM, of Rowallan, in the county of Ayr, was born about the year 1594. He was the eldest son and heir of a knight of the same name, and the family to which he belonged was one of the most antient and distinguished in that part of the country: it terminated in Jane Mure, great-grandmother of the present countess of Loudoun and marchioness of Hastings. Of the poet's early life few memorials have been preserved. It would appear however that his character and genius were soon developed: there is a specimen of his verses in English, dated in 1611, when he could be little more than seventeen years old: before his twentieth year he attempted a version of the classic story of Dido and Æneas; and in 1617, when he was scarce four-and-twenty, he addressed the king at Hamilton, on his progress through the country, in a poetical piece which is embodied in the collection entitled 'The Muse's Welcome.' Previous to this time, when he came of age, yet before he had succeeded to his paternal estate, he married for his first wife Anna, daughter of Dundas of Newbiston, by whom he had five sons and six daughters. His second wife was dame Jane Hamilton, lady Duntreath, and of this marriage there were two sons and two daughters.

During the civil war, Sir William took the popular side,

and in the first army raised against the king, he commanded a company of the Ayrshire regiment. He was a member of the convention in 1643, when the solemn league and covenant was ratified with England; and the next year he accompanied the troops, which, in terms of that treaty, were despatched in aid of the parliament. He was also present, and wounded, in the decisive battle of Long Marston Moor; and in the succeeding month he was engaged at the storming of Newcastle, where, in consequence of the superior officer being disabled, he had for some time the command of the regiment. Little further is known of him, except that on the revision of Roos's Psalms by the General Assembly in 1650, a version by Muro of Rowallan is spoken of as employed by the committee appointed for the improvement of the psalmody. He died in 1657.

By far the greater portion of Sir William's writings remain in manuscript. Various specimens of his compositions however may be found in a small volume entitled 'Antient Ballads and Songs, chiefly from Tradition, Manuscripts, and scarce works, with Biographical and Illustrative notices, including Original Poetry, by Thomas Lyle,' London, 1827; to which Chambers owns himself indebted for the materials of his notice concerning Sir William in his 'Biographical Dictionary of Eminent Scotsmen.' To this latter we also refer.

MURET, MARC ANTOINE FRANÇOIS (MURETUS in the Latinised form of his name), was born near Limoges in 1526. He learnt, with great facility, Greek and Latin, and at the age of eighteen gave lectures on Cicero and Terence in the college of Auch. He afterwards went to Paris, where he taught philosophy and civil law in the college of Ste. Barbe with great success. Being accused, according to Scaliger and some others, of an unnatural vice, he quitted Paris for Toulouse, which he was also obliged to leave. He proceeded to Italy in the greatest distress, and on his journey fell ill at an obscure inn on the road. The medical men of the place, having examined his condition, proposed among themselves in Latin (which they thought he did not understand) to try upon him some new experiment: 'Faciamus experimentum in corpore vili.' Muret was so alarmed at hearing this, that he mustered strength enough to pursue his journey.

All this account however is contradicted, or rather discarded with disdain by his biographers, F. Benci and Lazeri, whose notices of Muret's life are annexed to Ruhnken's edition of Muret's works, 4 vols. 8vo., Leyden, 1789. It is certain however that Muret repaired to Venice in 1554, where he became intimate with Paolo Manuzio, who published several of his commentaries on the classics. In 1559 he accepted the invitation of Cardinal Ippolito d'Este, and went to live with him at Ferrara, and afterwards accompanied the cardinal to Rome, from whence he repaired to France with the papal legate in 1562. In the following year he returned to Rome, where he was highly esteemed by Pope Pius V. and his successor Gregory XIII.

He entered into holy orders, obtained several benefices, and was appointed professor of philosophy, and afterwards of civil law at Rome. He died at Rome in 1585. His principal works are,—1, 'Commentarius de Origine Juris;' 2, 'Commentarius de Legibus, Senatusque Consultis, et longa Consuetudine;' 3, 'Commentarius in Titulos ad Materiam Jurisdictionis pertinentes;' 4, 'Notæ in Justiniani Institutiones;' 5, 'Orationes.' Several of these are funeral eulogies in the usual laudatory style of such compositions. In that on the occasion of the death of Charles IX., king of France, delivered at Rome in 1574, he praises that king for having extirpated heresy in his kingdom. In fact Muret was a learned scholar, and a rhetorician, but by no means a philosopher. His 'Poemata' have grace and fluency, but little of invention or poetical genius, excepting perhaps some of his epigrams. But his commentaries and scholia upon Aristotle's 'Ethics and Rhetoric,' on Plato's 'Republic,' on Cicero's 'Catilinarias and Philippicas,' on Seneca's 'Epistles,' on Sallust and Tacitus, on Terentius, Catullus, and Horace, are truly valuable, as well as his nineteen books 'Variarum Lectionum' of different classical authors.

MUREX. [SIPHONOSTOMATA.]

MURIATIC ACID. [CHLORINE.]

MU'RIDÆ, the name of an extensive family of Rodents, comprising, when taken in its largest sense, a great number of genera and species, which, though none of them attain to any considerable size, become worthy of serious notice from their prodigious multiplication and the destructive influence which they exert over vegetation and the fruits of the labour of the agriculturist.

The Linnean genus *Mus* is thus characterised in the last edition of the 'Systema Naturæ:'—'Dentes primores inferiores subulati;' and, as might be expected from such a definition, it is made the receptacle not only for such rodents as are vernacularly known as *Rats* and *Mice*, but for the Guinea Pig, the Agutis, the Paca; in short for all the *Glires* then known, not arranged under the genera *Hystrix*, *Lepus*, *Castor*, and *Sciurus*. The remaining genus (*Noctilio*), placed by Linnæus among his *Glires*, belongs to the Bats. [CHEIROPTERA, vol. vii., p. 25.] Pallas concurred with Linnæus in uniting under one great genus (*Mus*) all the rodents provided with clavicles which had no striking external distinction, such as the tail of the squirrel or the beaver.

Gmelin separated from this crowd of rodents the Marmots (*Arctomys*), the Dormice (*Myoxus*), and the Jerboas (*Dipus*).

Cuvier, in the last edition of the 'Règne Animal,' carries this subdivision much further, adopting the following subgenera, under the great genus *Mus*, or the *Rats*:—The Marmots (*Arctomys*, Gm.), the Dormice (*Myoxus*, Gm.), *Echymys*, Geoff. (*Loncheres*, Ill.), *Hydromys*, Geoff., *Capromys*, Desm., the Rats and Mice, properly so called (*Mus*, Cuv.), *Gerbillus*, Desm. (*Meriones*, Ill.), *Meriones*, F. Cuv., the Hamsters (*Cricetus*, Cuv.), the *Campagnols*, or Field Rats and Mice (*Arvicola*, Lacép.), which he subdivides into—1st, The Ondatras (*Fiber*, Cuv.), and, 2nd, the ordinary *Campagnols* (*Arvicola*, Cuv.; *Hypudæus*, Ill.), —the Lemmings, Cuv. (*Georychus*, Ill.), *Otomys* (F. Cuv.), and the Jerboas (*Dipus*, Gm.). To these succeed the Jumping Hares (*Helamys*, F. Cuv.; *Pedetes*, Ill.), the Mole-Rats (*Spalax*, Guld.), the *Oryctères*, F. Cuv. (*Bathyergus*, Ill.), *Geomys*, Raf. (*Pseudostoma*, Say, *Ascomys*, Licht., *Saccomys?* F. Cuv.), and *Diplostoma*, Raf.

Mr. Gray, in his 'Outline' (*Ann. Phil.*, 1825), after observing that the *Glires* are exceedingly difficult to arrange, and that the arrangement given is only 'an attempt according to their habits,' makes *Muridæ* the first family of the order, with the following character:—'Cutting teeth two in each jaw, lower awl-shaped, grinders simple or compound, upper shelving backward, lower forwards;' limbs proportionate, tail scaly, fur with scattered longer hairs, or flat spines, clavicles distinct.'

He then subdivides the family as follows:—

† Grinders rooted, simple.

1. *Murina.*—*Mus.*, Lin.; *Otomys*, F. Cuv.; *Capromys*, Desm.
2. *Hydromina.*—*Hydromys*, Geoff.

†† Grinders rootless, compound.

3. *Ondatrina.*—*Ondatra.*
4. *Castorina.*—*Castor*, Lin.; *Osteopora*, Harlan.
5. *Echymina.*—*Echymys*, Geoff.; *Heteromys*, Desm.; *Saccomys*, F. Cuv.

Dr. Fischer, in his 'Conspectus Ordinum et Generum' (1829), divides the Glires into two sections: the first consisting of those with complete clavicles; and the second of those which have none. The following genera are thus arranged under the first section:—*Castor*, *Lemmus*, *Spalax*, *Saccophorus*, *Loncheres*, *Myoxus*, *Hydromys*, *Capromys*, *Mus*, *Cricetus*, *Saccomys*, *Pedetes*, *Dipus*, *Aulacodus*, *Arctomys*, *Sciurus*, *Pteromys*, and *Cheiromys*.

Mr. Swainson, in his 'Classification of Quadrupeds' (1835), also separates the *Glires* into two divisions: the first, or *Glires Proper*, with clavicles; and the second with rudimentary clavicles, or none. In the first division, after the genera *Castor*, *Fiber*, and *Myopotamus*, and an observation in a note to the first section, that these divisions are purely artificial, and merely formed to facilitate the search among so many unarranged groups, we find the following sections:—

1. *Rats* and *Mice*, under which are arranged the following genera:—*Arvicola*, Lacép. (*Hypudæus*, Ill.). Example, *Mus Amphibius*, Linn., *Water-Rat*, Penn.; *Georychus*, Ill. (Lemmings). Example, *Mus Norvegicus*, Linn., the *Lemming*;* *Echimys*, Geoff. (Spined Rats). Ex., *Echimys cristatus*, Desm., *Gilt-Tailed Dormouse*, Penn.; *Myoxus*, Gm. (Dormouse). Ex., *Mus avellanarius*, Linn., the *Com-*

* *Georychus* is generally considered to signify the *Mole-Rats*. The true Lemmings, such as *Mus Norvegicus*, are closely allied to *Arvicola*.

mon *Dormouse*; *Hydromys*, Geoff. (Water-Rat). Ex., *H. leucogaster*, Australia; *Mus*, Auct. Ex., *Mus Rattus*, Linn., Common Rat; *Capromys*, Desm. Ex., *Capromys prehensilis*, South America; *Cricetus* (Hamster). Ex., *Cricetus vulgaris*, the Hamster.

2. Fore-legs very short, hind-legs long. *Jumping Mice*; under which come the following genera and subgenera:—*Dipus* (Jerboa). Ex., *Mus Jaculus*, Linn. (D. Sagitta, Dum.); subgenus *Gerbillus*, Desm. Ex., *Mus Tamariscinus*, *Tamarisk Jerboa*, Sh.; *Meriones*, F. Cuv. Ex., *Meriones Labradorius*; subgenus *Pedetes*, Ill. Ex., *Mus Caffer*, Pall., *Cape Jerboa*, Penn. Then follows *Lagostomus*, Brookes, with its subgenera *Chinchilla* and *Lagotis*. [CHINCHILLIDÆ.]

3. Tail very short. *Mole* and *Sand Rats*, including *Geomys*, Schmaltz (Sand Rat). Ex., *Geomys Douglasii*, America; *Diplostoma*, Schmaltz, America; *Aplodontia*, Richardson. Ex., *Aplodontia leporina*, America; *Aspalax*, Güld.* Ex., *Mus Typhlus*, Pall., Asia; *Bathyergus*, Ill. Ex., *Mus maritimus*, Gm., Africa.

4. Tail long, bushy. *Squirrels*, under which are arranged *Arctomys*, Gm. Ex., *Mus Marmotta*, Linn., the *Marmot*; *Spermophilus*, F. Cuv. Ex., *Mus citellus*, Pall., chiefly America. *Sciurus*, Auct. Ex., *Sciurus vulgaris*, Linn., the *Common Squirrel*; together with the subgenus *Pteromys*, Geoff., and the genus *Cheiromys*.

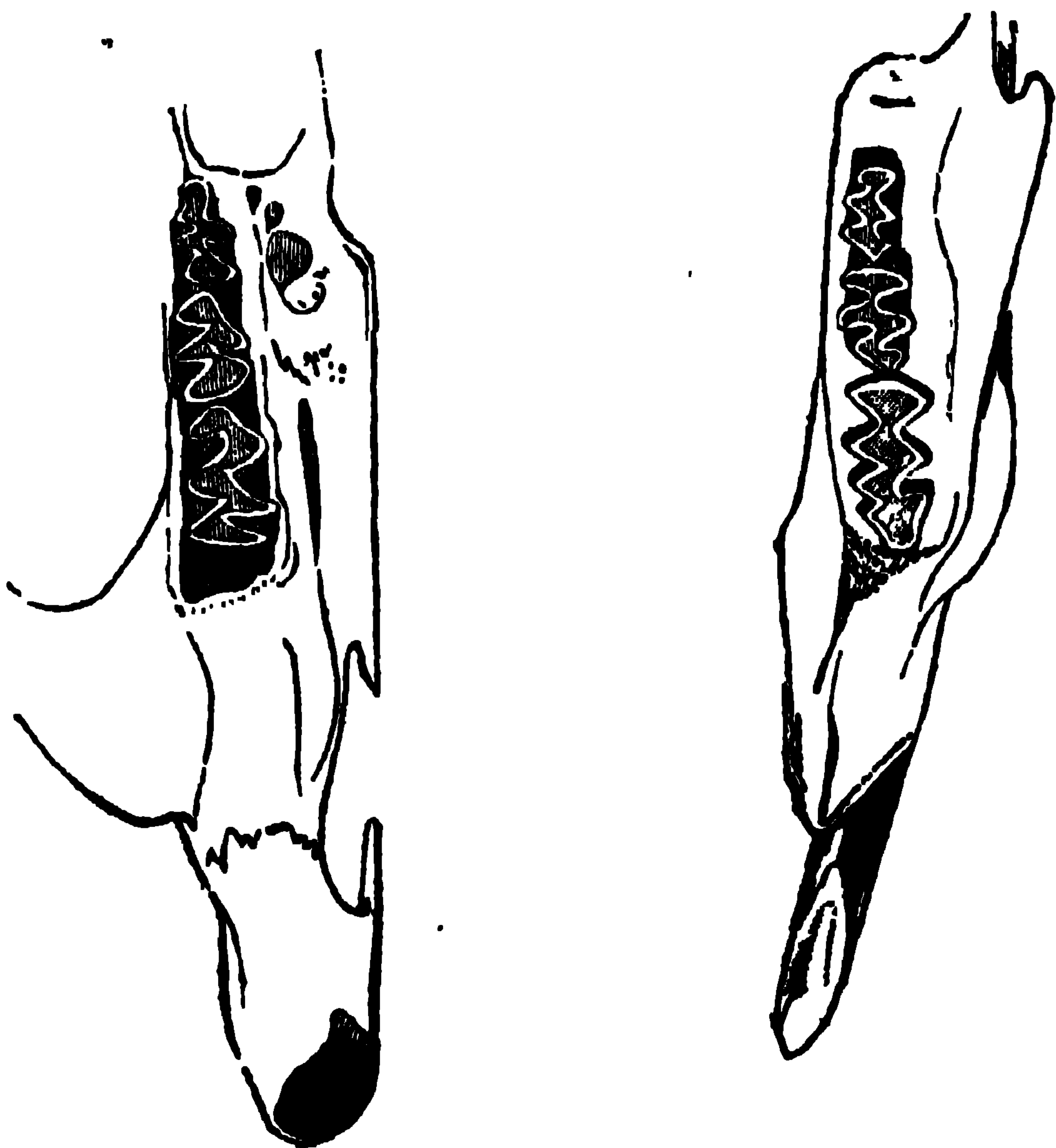
The numerous forms which press upon the attention in considering this large section of *Mammalia* are enough to convince any one who has bestowed any thought on the subject that authors have not spoken of the difficulties surrounding it without reason; we shall therefore introduce the student to the most remarkable among them, and, adopting Mr. Swainson's names for the three first sections as arbitrary divisions under which we may bring the structure and habits, where they are known, of these animals before the reader, proceed to examine the natural history of this great and destructive group.

RATS and MICE (popularly so called).

Genera. Arvicola.

Generic Character.—Ears moderate. Muzzle obtuse. Anterior toes armed with moderate claws. Tail round and hairy, not so long as the body. Number of teats from eight to twelve. Molars composite with flat crowns, presenting angular enamelled laminæ.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{3}{3} = 16$.



Teeth of Arvicola. (F. Cuv.)

Cuvier divides the great genus *Arvicola* of Lacépède (*Campagnols*) into the *Ondatras* (*Fiber*, Cuv.) [MUSQUASH], and the *Campagnols Ordinaires* (*Arvicola*, Cuv.; *Hypudæus*, Ill.); and so they stand in Cuvier's last edition of the 'Règne Animal.' M. Lesson, in his 'Manuel,' states that Cuvier has formed two subdivisions of the *Arvicolæ*, namely, first, the *Campagnols nageurs*, of which M. Lesson gives *Arvicola amphibius*, Desm., *Mus amphibius*, Linn., as an example; and second, the *Campagnols Terrestres*, which may be exemplified by *Arvicola agrestis*.

Adopting this latter subdivision of *Arvicola* in its restricted sense for convenience, there being hardly sufficient difference in the structure, whatever there may be in habits, to justify the breaking the true *Arvicolæ* down into two groups, we shall, before we proceed to the description of the two examples selected, detain the reader very shortly with the views of two modern English naturalists of note with respect to the *Arvicolæ*.

Mr. Gray raises this group to the rank of a family under the name of *Arvicolidæ*, and under it places his genus *Ctenodactylus*, a word, by the way, which comes very near to Dejean's name for a genus of Coleopterous insects, *Ctenodactyla*. [CTENODACTYLUS, CTENODACTYLA.] N.B. Mr. Yarrell is of opinion that *Ctenodactylus Massonii* of Gray, is, as suggested by Mr. Ogilby, identical with the *Mus Gundi* of Rothman, on whose description is founded the *Arctomys Gundi* of Gmelin and others, and the *Gundi Marmot* of Pennant's 'Zoology.'

Mr. Bell, in his *British Quadrupeds*, observes that the location of the *Arvicolæ* with the genus *Mus* involves an inconsistency which was early detected, and the correction of which has been universally recognised and followed. The characters of the teeth, he remarks, as well as the general form of the body, and the habits of all the species, remove them not only generically from the *Mures*, but even point out their association with a different family of the *Rodentia*, and their affinity to the beaver, he adds, appears to have forcibly struck Linnæus himself, who, in his *Fauna Suecica*, applied the name *Castor* to the European *Water Vole*, or *Water Rat*. Mr. Bell then continues thus: 'The generic term *Arvicola*, if not absolutely unobjectionable, must be retained, as having the sanction of priority over the name *Microtus* of Schrank, *Hypudæus* of Brünt, or *Lemmus* of F. Cuvier. With regard to the name of the family, I have ventured to change that of Mr. Gray, *Arvicolidæ*, to *Castoridæ*, because the genus *Castor* must be considered as the type of the family, of which the present can only be an aberrant form.' [BEAVER.]

§ 1. *Water or Swimming Arvicoles or Voles.*

The author last quoted gives the following synonyms for—

Arvicola amphibius, Desm.—*Castor caudâ lineari tereti* (Linn. 'Faun. Suec.'). *Mus amphibius* ('Syst. Nat.' Mull., 'Zool. Dan. Prod.'). *Mus aquaticus* (Briss.). *Lemmus aquaticus* (F. Cuv.). *Arvicola amphibia* (Jenyns). *Arvicola aquatica* (Flem.). *Rat d'eau* (Buff.). *Water Rat* (Penn.).

Description.—Head thick, short, and blunt; eyes small, not very prominent; ears short, scarcely conspicuous beyond the fur; the cutting-teeth of a deep yellow colour in front, very strong, chisel-shaped, considerably resembling those of the beaver; the surface of the grinding-teeth formed of alternate triangles arranged on each side of the longitudinal axis; fore-feet with four complete toes, the last phalanx only of the thumb being conspicuous beyond the skin; hinder feet with five toes not webbed, though connected to a short distance from the base; tail more than half the length of the body, covered with hairs, of which those on the inferior surface are rather long, and probably assist the animal in swimming by forming a sort of rudder of the tail. Fur thick and shining; of a rich reddish-brown mixed with grey above, yellowish-grey beneath. Dimensions,

—Length of the head and body	8 in.	4 lines.	
„ of the head	1	10 „	
„ of the ears	0	5 „	
„ of the tail	4	8 „	(Bell.)

This appears to be the *Sorgo morgange* of the Italians; *Wasser-mause-Rat* of the Germans; *Water-rot* of the Dutch; *Watn-ratta* of the Swedes; *Vand-rotte* of the Danes; *Llygoden y dwfr* of the antient British; and *Water Vole* and *Water Rat* of the modern British.

Ray names it *Mus major aquaticus, seu Rattus aquaticus*, and he, as well as Linnæus, states that the Water Rat is web-footed. This puzzled White of Selborne, who, in one of his letters to Pennant, writes, 'Ray says, and Linnæus after him, that the water rat is web-footed behind. Now I have discovered a rat on the banks of our little stream that is not web-footed, and yet is an excellent swimmer and

* Aspalax is Olivier's name; Spalax is Güldenstadt's.

diver: it answers exactly to the *Mus amphibius* of Linnæus (see *Syst. Nat.*) which, he says, "natat in *fossis et urinatur.*" I should be glad to procure one "plantis palmatis."' This letter is dated early in August, 1767, and Pennant in his *Synopsis* (1771), says of the *Water Rat* that it 'swims and dives admirably, though it is not web-footed, as Mr. Ray supposed and Linnæus copied after him.'

Food, Habits, &c.—The Water Rat inhabits the banks of rivers, streams, ponds, and even ditches, in the banks of which it burrows and breeds. Its retreat is however sometimes at a great distance from the water. White (*Selborne*), says, 'As a neighbour was lately plowing in a dry chalky field, far removed from any water, he turned out a water rat, that was curiously laid up in an *hybernaculum* artificially formed of grass and leaves. At one end of the burrow lay above a gallon of potatoes regularly stowed, on which it was to have supported itself for the winter. But the difficulty with me is how this *amphibius mus* came to fix its winter station at such a distance from the water. Was it determined in its choice of that place by the mere accident of finding the potatoes which were planted there? or is it the constant practice of the aquatic rat to forsake the neighbourhood of the water in the colder months?' We suspect that the potatoes had their charms for the storekeeper. The Water Rat is indeed entirely, as we believe, a vegetable feeder, roots and subaqueous plants being its staple. It has been said to feed on worms, frogs, small fish, and the fry of fish generally, among other animal food; and has thence laboured under a very bad character as the enemy of the fish-pond and the trout-stream. The best writers are agreed that there is no foundation for this charge,* and there can be little doubt, as Mr. Bell observes, that it has arisen from this phytiphagous animal being confounded by inaccurate observers with the common *Brown Rat* (*Mus decumanus*) which often haunts ditches and mill-tails, feeding freely on all sorts of animal substances, and taking the water boldly. The last-named rats have been seen towards nightfall crossing the canal in the Regent's Park in order to forage in the gardens of the Zoological Society.

The *Water Rat* is a very cleanly animal, and, generally, has but one brood, consisting of five or six: these are ordinarily born in May or June, when the vegetation is well forward; but the young are sometimes produced as early as April, in which latter case there is a second litter towards the end of summer or beginning of autumn. The flesh is said to be eaten by the French peasants on *maigre* days.

Geographical Distribution.—Most parts of Europe.

Mr. Bell, who gives a very good figure of the *Common Water Vole*, or *Water Rat*, remarks that a black variety of this species has long been known, and that it has been described by Pallas and other continental zoologists. Mr. Bell is of opinion that this is probably identical with the quadruped described by Mr. Macgillivray in the sixth volume of the 'Transactions of the Wernerian Society of Edinburgh,' under the name of *Arvicola ater*, as very common in the counties of Banff and Aberdeen. The *Water Vole*, it is stated, does not occur where this *Arvicola ater* abounds. The habits of the latter agree with those of the *Water Vole*. Mr. Macgillivray however thinks that there are sufficient differences in the organisation and colour of these two animals to warrant specific distinction. *Arvicola ater* is stated to be deep black above, and black with a tinge of grey beneath; in size somewhat smaller than the *Common Water Vole*, but the difference of the proportions is scarcely appreciable. Mr. Bell observes that this author believes the number of caudal vertebræ to be different; and he adds that, if this were constantly the case, it would go far to establish their specific distinction; but an examination of a stuffed specimen belonging to Mr. Bell's friend, Mr. Yarrell does not, on a comparison with several of the common sort, appear to Mr. Bell to justify this supposition. 'Mr. Jenyns,' continues Mr. Bell, 'states that the black variety is not uncommon in the fens of Cambridgeshire, and differs in no respect from the other but in colour; a testimony which must weigh very heavily against the opinion of its being specifically distinct, when we consider the great accuracy of that gentleman's observations.'

Terrestrial Arvicoles.

Arvicola Agrestis.—The following synonyms of this species are given by Mr. Bell:—*Mus agrestis brachyurus* (Ray). *Mus agrestis* (Linn.). *Mus arvalis* (Pall., Gmel.). *Lemmus arvalis* (F. Cuv.). *Arvicola vulgaris* (Desm.). *Arvicola agrestis* (Flem., Jenyns, Yarrell). *Arvicola arvalis* (Selys-Longchamps). *Campagnol* (Buff.). *Short-tailed Field Mouse* (Penn.). *Meadow Mouse* (Shaw).

Description.—Head large; muzzle very obtuse; ears just appearing above the fur; body thick and full; tail not more than one-third the length of the body, sparingly covered with hair; thumb of the fore-feet rudimentary, without a claw. Upper parts reddish brown, mixed with grey; of the under parts ash-colour; feet and tail dusky. Dimensions:—

	Inch.	Lines.
Length of head and body .	4	1
Length of head . . .	1	2
Length of tail	1	$3\frac{1}{2}$

(*Bell.*)

This appears to be *Le petit Rat de Champs* and *Le Campagnol* of the French; *Campagnolo* of the Italians; *Skier Muus* of the Danes; *Llygoden gwtta'r maes* of the antient British; *Field Vole*, *Short-tailed Field Mouse*, and *Meadow Mouse* of the modern British.

Habits, Food, &c.—Small and insignificant as the animal is in appearance, there is scarcely a species among the rodents more destructive to the fields, gardens, and woods, which have been rendered fruitful by the industrious hand of man, than the *Short-tailed Field Mouse*. In the corn-field, in the rick-yard, in the granary, in the extensive plantation, its depredations are often severe, and sometimes overwhelming. The following instance will show what damage these mice are capable of doing when they become multitudinous. Lord Glenbervie, in a letter to Sir Joseph Banks, dated 30th June, 1814, observes that the whole both of Dean and New Forests appeared to be numerously stocked with mice; at least, wherever the large furze-brakes in the open parts had been burnt, their holes and runs covered the surface. Haywood Hill, a new plantation of about 500 acres, in the forest of Dean, was particularly infested. This enclosure, after being properly fenced, was planted with acorns in 1810, and in the following spring about one-third came up; the rest of the seed having been probably destroyed by mice principally. The young shoots of the natural hollies of the tract, which had been cut down to favour the plantation, were not attacked by the mice in the winter of 1811, though their runs were numerous. In the autumn of 1812 a large quantity of five-years-old oaks and chestnuts, with ash, larch, and fir, were planted in the enclosure. In the winter the destruction began, and numbers of the hollies, then two, three, or more feet high, were barked round from the ground to four or five inches upwards, and died. In the spring of 1813 a number of the oaks and chestnuts were found dead, and when they were pulled up it appeared that the roots* had been gnawed through two or three inches below the surface of the ground; many were also barked round and killed, like the holly-shoots; whilst others, which had been begun upon, were sickly. The evil now extended to the other enclosures; and becoming very serious both in Dean Forest and the New Forest, cats were turned out, the bushes, fern, rough grass, &c. were cleared away to expose the mice to beasts and birds of prey, poisons in great variety were laid, and seven or eight different sorts of traps were set for them, some of which, made of tin, succeeded very well. These were however superseded by the plan of a professed rat-catcher, who, having been employed to catch the mice, had observed, on going to work in the morning, that some of them had fallen into wells or pits, accidentally formed, and could not get out again; many of them dying from hunger, or fatigue in endeavouring to climb up the sides. Such pits were therefore, on his recommendation, immediately tried: they were at first made three feet deep, three long, and two wide; but these were found to be unnecessarily large, and, after various experiments, it appeared that they answered best when from eighteen to twenty inches deep at the bottom, about two feet in length, and one foot and a half in width, and, at top, only eighteen inches long and nine wide, or indeed as small as the earth could be got out of a hole of that depth; for the wider they are below and the narrower above, the better they answer their purpose. They were made about twenty yards asunder, or about

* It is more sinned against than sinning in this respect; for the quadruped is often devoured by the Pike, and, we suspect, sometimes by the very large trouts. For the former fish it is by no means a bad bait, if dexterously used.

* Mr. Hogg suggested the generic name *Rhizomys* for the animal, from this root-eating propensity.

twelve on an acre; or, where the mice were less numerous, thirty yards apart. Nearly 30,000 mice had been caught, principally by this last method, in Dean Forest, up to the 22nd of December; and Mr. Davies (the deputy-surveyor) was convinced that a far greater number had been taken out of the holes, either alive or dead, by stoats, weazels, kites, owls, &c., and even by crows, magpies, jays, &c. The success of these holes in Dean Forest was so great, that the use of a bait in them was soon discontinued; but from an inaccuracy in the digging of them, or some other cause, they were far less efficacious in the New Forest, where the mice continued still, though less numerous, to infest our plantations. It was hoped that the severe weather would have either totally destroyed or greatly diminished the numbers of these animals, for they did not venture out during the hard frosts. In a letter from Mr. Davies, dated the 8th of March, 1814, he gives only 1246 as the number taken from the 7th of January to the 5th of March, and he says the whole of these had been caught in a few days of open weather which intervened about that time. The total number taken in Dean Forest to the 8th of March, 1814, did not much exceed 30,000; and in the New Forest only about 11,500 had been taken up to the same period. In both forests two sorts of Mice had been observed, one the Short-tailed, the other the Long-tailed Field-Mouse; but the former was by far the most numerous, particularly in Dean Forest, where it was in the proportion of upwards of fifty to one Long-tailed.

Buffon speaks of similar depredations to plantations by the species under consideration; but though he seems to have tried the same sort of trap which was used in the English forests above-mentioned, he does not appear to have resorted to the plan of making holes, which is stated to have been successfully employed by the farmers in the neighbourhood of Liege; but though they make the holes round, and not more than four inches in diameter, and a foot deep, the success seems to be complete.

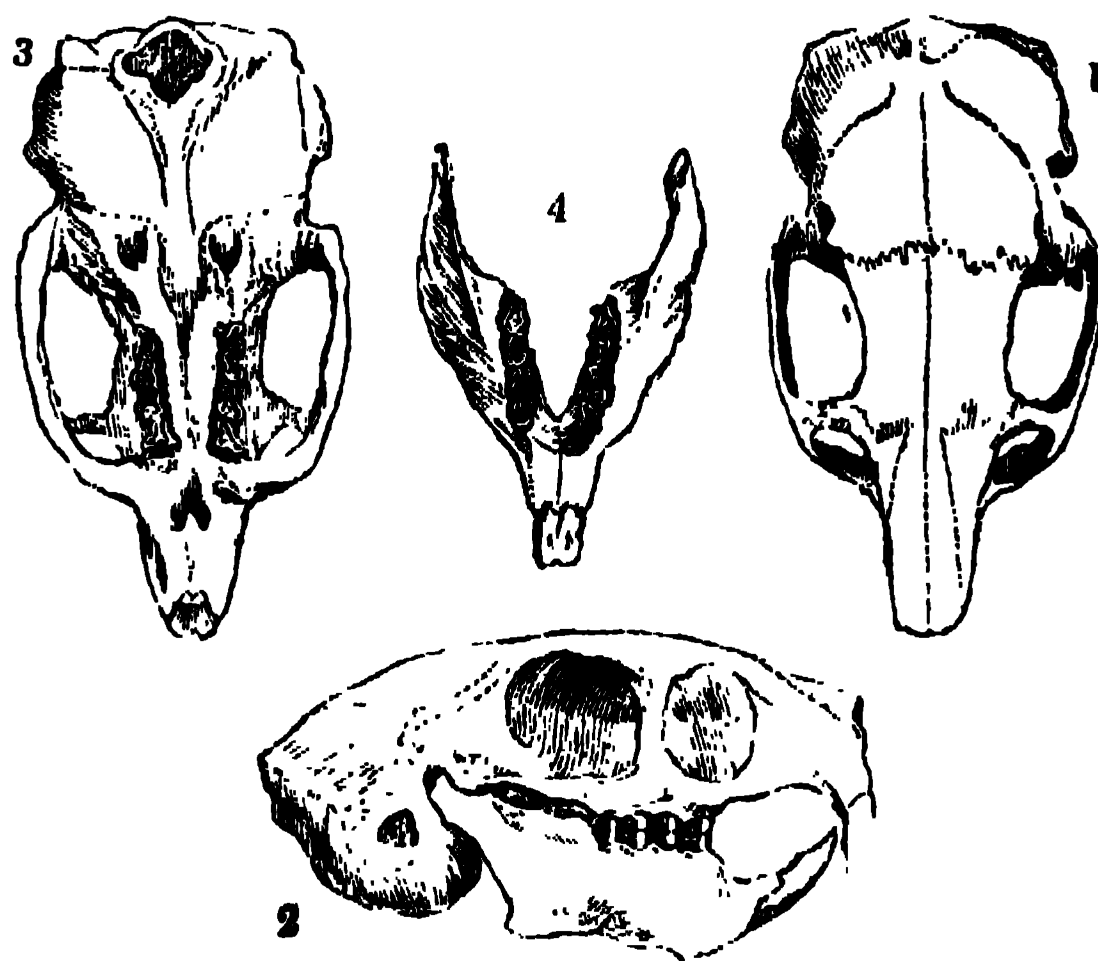
This destructive Arvicole is a burrower, though it not unfrequently takes up with the subterranean retreat of another animal, that of the mole, for instance. The wheat-rick and the barn are not unfrequently infested by them, but their favourite situations are low and damp. Dry seasons are fatal to them. The nest is formed in some bank or meadow, generally of dried grass, and from five to seven young ones are produced at a birth. To this species, or to the Long-tailed Field-Mouse, the latter most probably (see *post*, p. 505), White appears to allude in the letter containing anecdotes of the maternal affections of animals, when he speaks of a remarkable mixture of instinct and sagacity which occurred to him one day, when his people were pulling off the lining of a hotbed, in order to add some fresh dung:—'From out of the side of this bed leaped an animal with great agility that made a most grotesque figure; nor was it without great difficulty that it could be taken, when it proved to be a large white-bellied Field-Mouse, with three or four young clinging to her teats by their mouths and feet. It was amazing that the desultory and rapid motions of this dam should not oblige her litter to quit their hold, especially when it appeared that they were so young as to be both naked and blind.'

Geographical Distribution.—Europe.

Mr. Bell is of opinion that the *Arvicola riparia* of Yarrell (*Zool. Proc.*, 1832) is no other than the *Arvicola pratensis* of Baillon and the *Arvicola rufescens* of Selys-Longchamps.

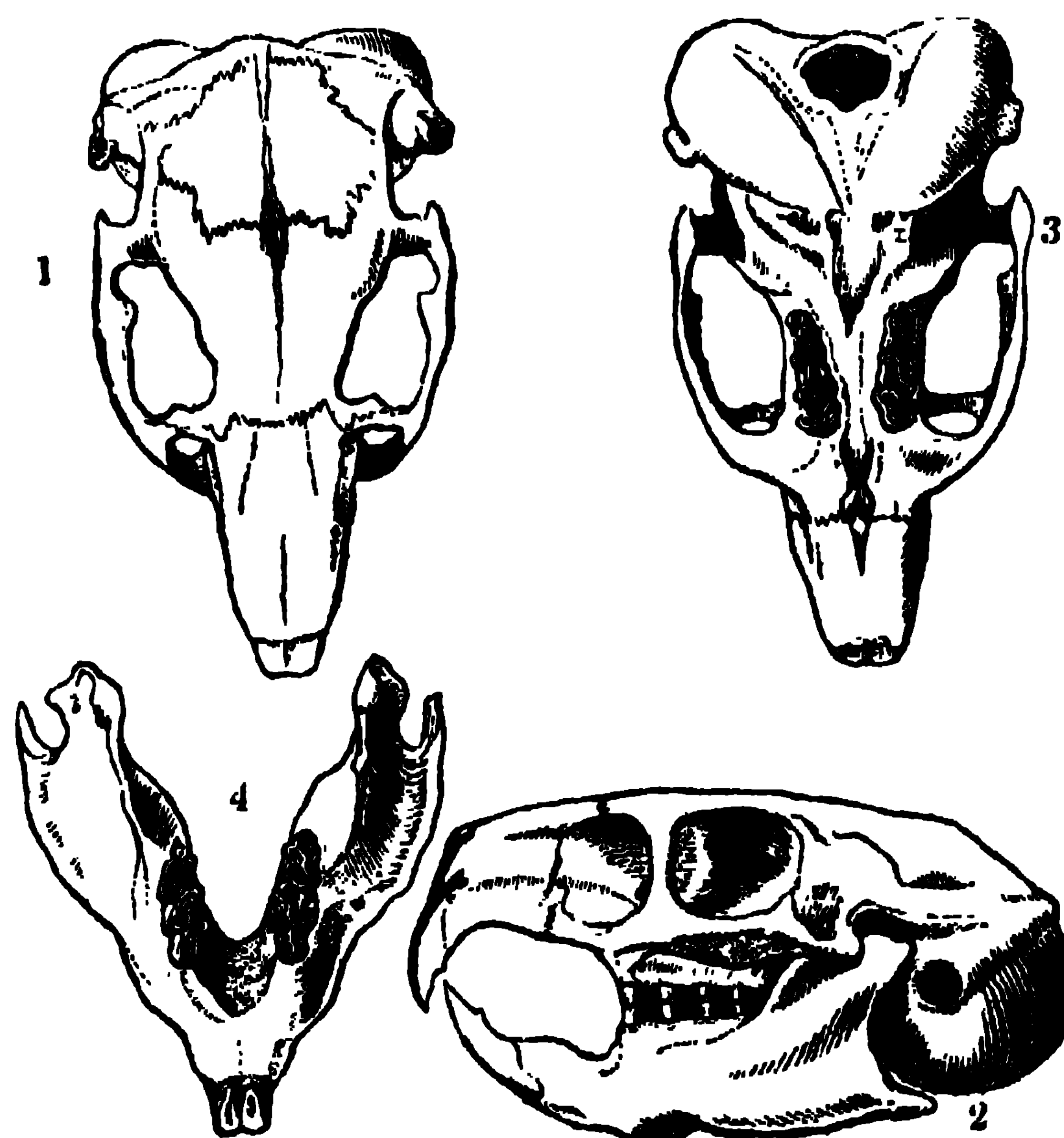
Octodon.

Mr. Bennett observes that 'In the structure of its molar teeth, *Octodon* may be regarded as occupying an intermediate station between *Poephagomys* and *Ctenomys*. In *Octodon* the molars of the upper jaw differ remarkably in form from those of the lower. The upper molars have on their inner side a slight fold of enamel, indicating a groove tending in some measure to separate on this aspect the mass of the tooth into two cylinders: on their outer side a similar fold penetrates more deeply, and behind it the crown of the tooth does not project outwardly to so great an extent as it does in front. If each molar tooth of the upper jaw be regarded as composed of two partially united cylinders, slightly compressed from before backwards, and somewhat oblique in their direction, the anterior of these cylinders might be described as entire, and the posterior as being truncated by the removal of its outer half. Of such teeth there are, in the upper jaw of *Octodon*, on each side, four; the hindermost being the smallest, and that in which the peculiar form is least strongly marked. In *Ctenomys*, all the molar teeth, both of the upper and the lower jaw, correspond with the structure that exists in the upper jaw of *Octodon*, excepting that their crowns are more slender and more obliquely placed, whence the external emargination becomes less sharply defined; and also excepting that the hinder molar in each jaw is so small as to be almost evanescent: as is generally the case, however, the relative position of the teeth is counterchanged, and the deficiency in the outline of the crown of the tooth, which in the upper jaw is external, is, in the lower jaw, internal. In the lower jaw of *Octodon* the crowns of the molars assume a figure very different from those of the upper, dependent chiefly on the prolongation of the hinder portion of the tooth to the same lateral extent as its anterior part: each of them consists of two cylinders, not disjoined in the middle where the bony portion of the crown is continuous, but partially separated by a fold of enamel on either side producing a corresponding notch; placed obliquely with respect to the jaw they resemble, in some measure, a figure of 8 with its elements flattened obliquely, pressed towards each other, and not connected by the transverse middle bars. With the lower molars of *Octodon* those of *Poephagomys*, as figured by M. F. Cuvier, correspond in structure in both jaws. *Octodon* thus exhibits, in its dissimilar molars, the types of two genera: the molars of its upper jaw represent those of both



Skull of Octodon.

1, seen from above; 2, profile; 3, seen from below; 4, lower jaw seen from above.



Skull of Ctenomys.

1, seen from above; 2, profile; 3, seen from below; 4, lower jaw seen from above.

jaws of *Ctenomys;* those of its lower jaw correspond with the molars of both jaws of *Poephagomys*.'

Octodon Cumingii, Benn. (*Dendrobius degus*, Meyen.)

In size and shape generally resembling the *Water Rat*, with which Mr. Bennett thinks that it is nearly connected systematically. All the feet with five toes, but the innermost both before and behind very short, and separated by a wide interval from the rest. Upper surface and sides brownish grey, intermixed with frequent indistinct and undefined spots and patches of dusky black. Colour slightly darker towards the rump, and upper surface of the entire tail, together with its under surface for one-third of its length from the tip, approaching closely to black. Under surface of the body dusky grey, mingled with a shade of brown, lighter and nearly white beneath the base of the tail, and deeper on the breast and the neck, where it becomes almost of the same general hue as the upper surface.

Habits.—Mr. Cuming thus describes the habits of *Octodon Cumingii* in its natural state. 'These animals burrow in the ground, but always under brushwood fences or in low thickets. They are so abundant in the neighbourhood of Valparaiso, that in the high-road between that place and St. Jago more than a hundred may frequently be seen at one time in search of food. Sometimes, but not often, they are observed on the lower branches of the shrubs, and on those which form the fences. They fly at the least alarm, and in running carry their tufted tails like a bent bow. A species of *Horned Owl* feeds principally on these pretty little creatures.' Mr. Bennett adds that two living specimens brought by Mr. Cuming from Chili, were placed by him, in 1831, in the Society's Menagerie: one of them escaped, but the other was alive when Mr. Bennett wrote (December, 1835), and was as active and lively as it was on its first arrival. They were rather shy, and had but little playfulness. They leaped readily and without any appearance of exertion from the floor of their cage to a narrow perch placed at the height of nearly a foot, and there remained seated at their ease. Their food was vegetable.

Locality.—Chili, near Valparaiso, where Captain King informed Mr. Bennett that he had seen thousands of them. (*Zool. Proc.* and *Zool. Trans.*)



Octodon Cumingii. (Bennett.)

Ctenomys.

Dentition, &c., see cut above.

Ctenomys Magellanicus. In general form seems nearly to resemble *Octodon Cumingii*. Toes five, the innermost, both before and behind, much shorter than the others. Tail sparingly haired, but comparatively shorter than in *O. Cumingii*, and destitute of any marked tuft of longer hairs at its extremity. Upper surface and sides brownish grey tinged with yellow, and hardly varied by blackish; in short the same as that of *Octodon*, but of a lighter tint. Colour of the belly lighter than the upper surface; chin and throat pale fawn; short hairs of feet and tail almost white. Length of head and body, 7·5 inches: of the tail 2·75.

Habits, &c.—Captain King's memoranda on the subject of this animal are: 'From the size of the jaw, as compared with the abundant remains of this little animal which are scattered over the surface of the ground, I think that the present specimen is rather a young one. On examining the teeth I find that it cannot be referred to any of the genera of M. F. Cuvier's arrangement in his *Dents des Mammifères:* that to which it approaches most nearly is *Helamys;* but it is sufficiently distinct to constitute a new genus. The red colour of the incisive teeth is very remarkable in all the specimens which I have seen. The little animal is very timid; feeds upon grass, and is eaten by the Patagonian Indians. It dwells in holes which it burrows in the ground: and, from the number of the holes, it would appear to be very abundant.' Mr. Darwin (*Journal and Remarks*) gives a circumstantial account of this curious animal, which he well describes as a rodent with the habits of a mole. 'The Tucutuco,' says that author, 'is extremely abundant in some parts of the country, but is difficult to be procured, and still more difficult to be seen when at liberty. It lives almost entirely under ground, and prefers a sandy soil with a gentle inclination. The burrows are said not to be deep, but of great length. They are seldom open; the earth being thrown up at the mouth into hillocks, not quite so large as those made by the mole. Considerable tracts of country are so completely undermined by these animals, that horses, in passing over, sink above their fetlocks. The tucutucos appear, to a certain degree, to be gregarious. The man who procured specimens for me had caught six together, and he said this was a common occurrence. They are nocturnal in their habits: and their principal food is afforded by the roots of plants, which is the object of their extensive and superficial burrows. Azara says they are so difficult to be obtained, that he never saw more than one. He states that they lay up magazines of food within their burrows. This animal is universally known by a very peculiar noise, which it makes when beneath the ground. A person, the first time he hears it, is much surprised; for it is not easy to tell whence it comes, nor is it possible to guess what kind of creature utters it. The noise consists in a short but not rough nasal grunt, which is repeated about four times in quick succession; the first grunt is not so loud, but a little longer, and more distinct than the three following: the musical time of the whole is constant, as often as it is uttered. The name Tucutuco is given in imitation of the sound. In all times of the day, where this animal is abundant, the noise may be heard, and sometimes directly beneath one's feet. When kept in a room, the tucutucos move both slowly and clumsily, which appears owing to the outward action of their hind legs; and they are likewise quite incapable of jumping even the smallest vertical height. Mr. Reid who dissected a specimen which I brought home in spirits, informs me that the socket of the thigh-bone is not attached by a *ligamentum teres;* and this explains, in a satisfactory manner, the awkward movements of their hinder extremities. When eating, they rest on their hind legs and hold the piece in their fore paws; they appeared also to wish to drag it into some corner. They are very stupid in making any attempt to escape; when angry or frightened, they uttered the tucutuco. Of those I kept alive, several, even the first day, became quite tame, not attempting to bite or to run away; others were a little wilder. The man who caught them asserted that very many are invariably found blind. A specimen which I preserved in spirits was in this state; Mr. Reid considers it to be the effect of inflammation in the nictitating membrane. When the animal was alive I placed my finger within half an inch of its head, and not the slightest notice was taken: it made its way however about the room nearly as well as the others.'

Locality.—The east entrance of the Strait of Magalhaens at Cape Gregory and the vicinity. (King.) Mr. Darwin says (*loc. cit.*) that the wide plains north of the Rio Colorado are undermined by these animals; and that near the Strait of Magalhaens, where Patagonia blends with Tierra del Fuego, the whole sandy country forms a great warren for them.

N.B. Mr. Darwin further states that at the R. Negro, in Northern Patagonia, there is an animal of the same habits, and probably a closely allied species, but which he never saw. Its noise was different from that of the Maldonado kind, and was repeated only twice instead of three or four times, and was more distinct and sonorous; when heard from a distance it so closely resembled the sound made in

cutting down a small tree with an axe, that Mr. Darwin sometimes remained in doubt concerning it.



Ctenomys Magellanicus. (Bennett.)

The genus *Sigmodon* of Say and Ord occupies, in their opinion, a station between the genera *Arvicola* and *Mus*, having the habits and some of the external characters of the former, with teeth remotely allied to the latter. The genus *Neotoma* of the same zoologists, must, in their opinion, be also placed near *Arvicola*. (See *Journal of Nat. Acad. Sc. Phil.*, vol. iv.; and *Zool. Journ.*, vol. ii.)

Hypudæus. (Ill.)

Closely allied to the *Arvicolæ*, from which they differ but little except in the number of the anterior toes, and in the shortness of the tail, are the true *Lemmings*.

Generic Character.—Molars composite, with an even crown presenting enamelled angular laminæ; ears very short; anterior feet generally pentadactyle and formed for digging; tail very short and thickly haired.

Dental Formula:—Incisors, $\frac{2}{2}$; molars, $\frac{3-3}{3-3} = 16$.

Example, *Hypudæus Norvegicus*.

Description.—Head not quite so blunt as in the *Arvicolæ*; whiskers long; eyes small but black and piercing; mouth small; ears small; fore-legs short, pentadactyle, but the thumb hardly perceptible though the claw is very sharp; hind-legs pentadactyle; skin thin; head and body black and tawny, irregularly disposed; belly white with a yellowish tinge. Length from nose to tail five inches or thereabout,* the tail half an inch.

This is the *Lemmar or Lemmus* of Olaus Magnus; the *Leem or Lemmer* of Gesner; *Mus Norvegicus vulgò Leming* of Wormius; *Mus Lemmus* of Linnæus; *Fial-mus* and *Sabell-mus* of the Laplanders; *Lummick* of the Swedes; *Le Leming* of Buffon; *Lemming* of the British; *Lemmus Norvegicus* of Desmarest; and *Mus Lemmus* of Pallas and Linnæus.

Habits, Food, &c.—The ordinary food of the *Lemming* consists of grass, the rein-deer lichen, and the catkins, &c. of the dwarf birch; but at intervals of time, generally once or twice in a quarter of a century, a great army of them appears: pouring onward in vast hosts, they devour every green thing in their path of desolation. Great bands descending from the Kolen, traverse Nordland and Finmark, ending their journey and their lives in the Western Ocean, which they enter and there perish. Others, taking a direction through Swedish Lapland, are drowned in the Gulf of Bothnia. Their march is stated to be in parallel lines about three feet apart, without stop or stay, unless the obstacle is insurmountable: rivers and lakes they cross without deviation, and they are said to gnaw through corn and haystacks. (*Phil. Trans.*, ii.) Pennant, who states that they appear in numberless troops in Norway and Lapland, where they are the pest and wonder of the country, thus graphically describes one of these irruptions. 'They march like the army of locusts so emphatically described by the prophet Joel; destroy every root of grass before them, and spread universal desolation: they infect the very ground, and cattle are said to perish which taste of the grass which they have touched: they march by myriads in regular lines: nothing stops their progress, neither fire, torrents, lake, or morass. They bend their course straight forward, with most amazing obstinacy; they swim over the lakes; the greatest rock gives them but a slight check, they go round it, and then resume their march directly on, without the least division: if they meet a peasant, they persist in their course, and jump as high as his knees in defence of their progress: are so fierce as to lay hold of a stick, and suffer themselves to be swung about before they quit their hold: if struck, they turn about and bite, and will make a noise like a dog.'

The *Carnivora* are close attendants upon these wandering multitudes, which Olaus and others believed to have been generated in the clouds and to have fallen from thence in storm and tempest. They are, says Pennant, 'the prey of foxes, lynxes, and ermines, who follow them in great numbers: at length they perish, either through want of food or by destroying one another, or in some great water, or in the sea. They are the dread of the country: in former times spiritual weapons were exerted against them; the priest exorcised and had a long form of prayer to arrest the evil: happily it does not occur frequently; once or twice in twenty years: it seems like a vast colony of emigrants from a nation overstocked; a discharge of animals from the great northern hive, that once poured out its myriads of human creatures upon Southern Europe. Where the head-quarters of these quadrupeds are is not very certainly known; Linnæus says the Norwegian and Lapland Alps; Pontopiddan seems to think that Kolens rock, which divides Nordland from Sweden, is their native place; but wherever they come from, none return: their course is predestinated, and they pursue their fate.'

When seeking the rein-deer lichen in the winter, the Lemmings get under the snow, making lodgments and opening spiracles to the surface to secure air: the *Arctic Fox* pursues them in these retreats. It does not appear that they lay up any magazines of food, and to this improvidence perhaps, as Pennant observes, may be traced the great migrations that they are compelled to make in certain years; hunger urging them to quit their usual residences.

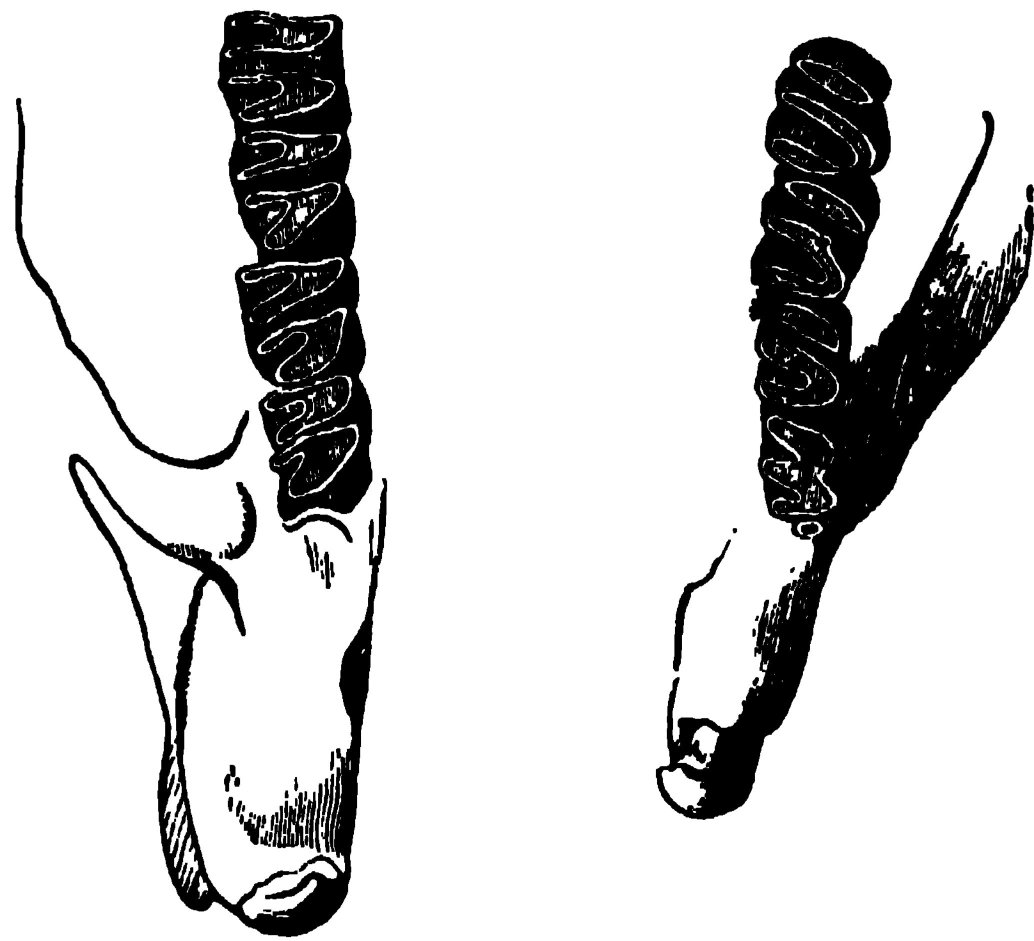
They breed often in the course of a year, producing five or six young at a birth, and they bring forth sometimes on their migrations. They are said to carry some of their young in their mouths and some on their backs.

The Laplanders, who compare their flesh to that of squirrels, eat them.

Echimys (Geoff.; Loncheres, Ill. part.)

Generic Character.—Four unguiculate toes and a vestige of a fifth on the anterior feet. Tail very long, scaly, and nearly naked. Hairs, especially those on the upper parts, flat and aciculated. Molars with transverse laminæ, united to each other by twos at one end or isolated.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.



Teeth of Echimys (dactylinus, young) enlarged. (F. Cuv.)

* Individuals from Russia and Lapland are said to be less than those from Norway and Sweden.

Example. — *Echimys chrysurus* (*Echimys cristatus*, Desm.?) The *Gilt-tail Dormouse* of Pennant; *Lerot à queue dorée* of Allamand

Description.—Ears short and broad, whiskers strongly developed, a gold-coloured line extending longitudinally from the nose to the space between the ears; head, body, and upper part of tail marone or shining purplish chesnut, ruddy marginate bristles being scattered between the hairs, which give the splendour to the animal; lower part of tail, which is thick at the base and longer than the body, golden. Length from nose to tail, five inches.

Habits, Food, &c.—This species is said to climb trees, and live principally on fruits.

Locality, Surinam.

Cercomys. (F. Cuvier.)

Generic Character.—In shape resembling the Black Rat, but with the chanfrein more arched and the ears larger. Anterior limbs considerably shorter than the posterior, which are terminated with five toes, the three middle ones longest; the anterior with four only, and the rudiment of a thumb with a small flat nail; all the other toes with compressed nails curved and pointed, and seeming more proper for climbing than burrowing. Tail very long, and like that of the Brown Rat. Fur composed of long, straight, firm hairs of a uniform texture, and of hairs which are finer, softer, and much thicker; no bristle as in *Echimys*. Molars with distinct roots of equal size, and their slightly elevated crown nearly circular, presenting at the surface a notch and three ellipses surrounded with enamel, as is the tooth itself. The notch is on the internal side in the upper molars, and on the external side in the lower molars. Great suborbital hole considerably extensive.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.

Example, *Cercomys cunicularius*.

Description.—Deep brown above, paler on the sides and the sides of the cheeks; jaws and neck beneath, as well as the under parts generally, whitish. Eyes and ears large.

Locality, Brazil.



Cercomys cunicularius.

Myoxus. (Schreber; Gmelin.)

Generic Character.—Four toes and the vestige of a fifth on the anterior feet; five toes behind. Fur very soft and fine. Tail very long, sometimes well clothed with hair and round, sometimes depressed, and sometimes tufted at the extremity only. Molars with transverse ridges of enamel projecting and hollowed.

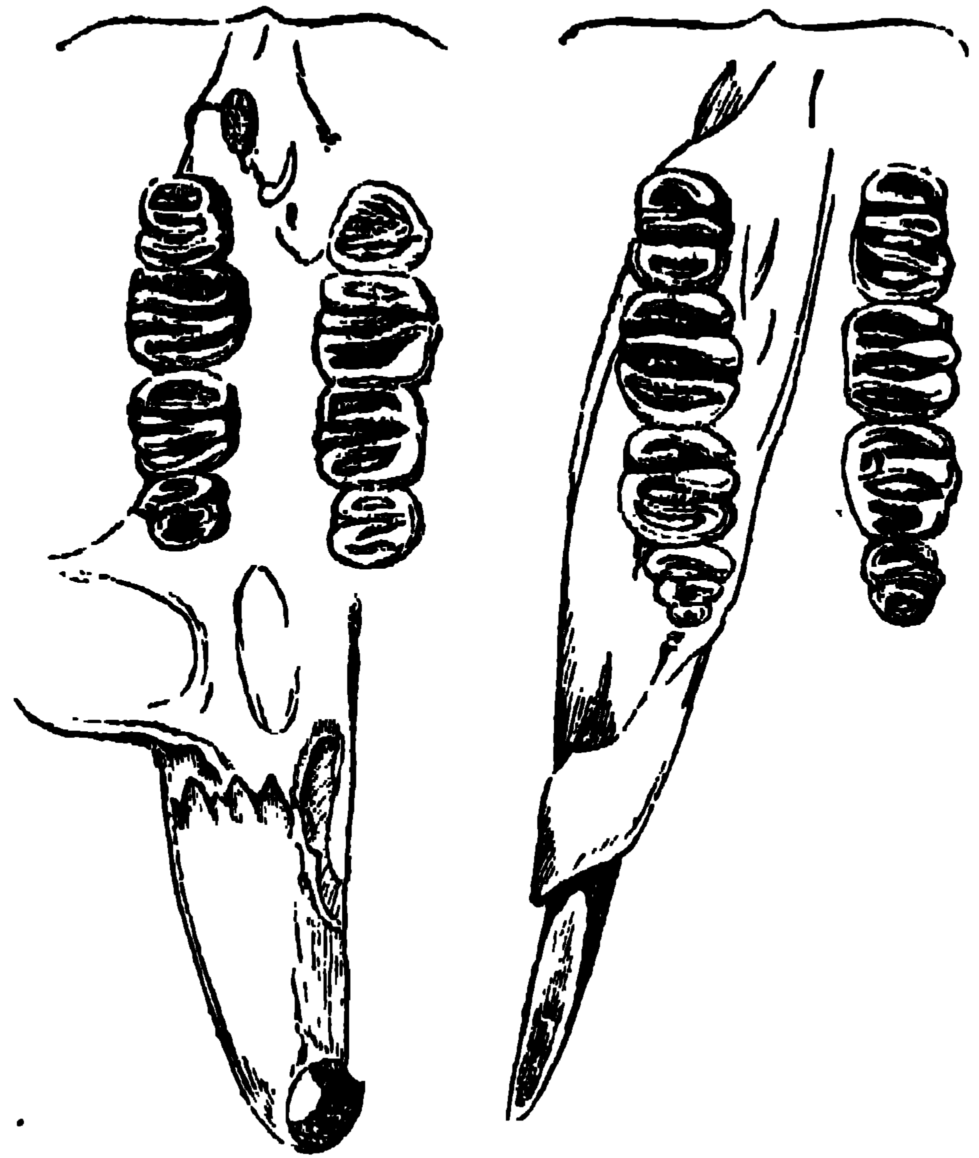
Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.

Example, *Myoxus avellanarius*.

Description.—Head proportionally large; eyes large, black, and prominent; muzzle not blunt; ears broad, about one third the length of the head; body plump and round; tail flattened, the hairs rather long and bushy; head, back, sides, belly, and tail tawny red; length that of a common mouse.

Young of a mouse-grey, head and flanks only tinged with red.

This is the *Muscardin*, *Croque-noix*, and *Rat-d'or* of the French; *Moscardino* of the Italians; *Liron* of the Spanish; *Rothe Wald-maus*, *Hasel-maus*, and *Hasel-schläfer* of the Germans; *Skogsmus* of the Swedes; *Kassel-muus* of the Danes; *Pathew* of the antient British; and *Dormouse* or *Sleeper* of the modern British.



Teeth of Myoxus, enlarged. (F. Cuv.)

There is little if any doubt that this species is the *Glis* of the Roman authors. Thus Pliny, in his chapter, 'De faginâ glande,' &c. (xvi. 6), says, 'Fagi glans muribus gratissima est ... glires quoque saginat;' and Martial (xiii. 59, 'Glires') writes—

> 'Tota mihi dormitur hyems, et pinguior illo
> Tempore sum, quo me nil nisi somnus alit.'

Nor does the occasional short awakening caused by a warm sunny day, to which the animal is subject, militate against the application of Martial's lines; for the occasional disturbance is the exception to the rule.

Mr. Bell places the Dormouse among the *Sciuridæ* (Squirrels); and indeed zoologists have assigned it to both the genus *Sciurus* and *Mus*. In its habits it comes near to the squirrel, but in its dentition it is nearer to the mice. It is in truth one of those forms by which Nature glides from one race of animals to another. Mr. Bell gives the following synonyms:—*Mus avellanarius minor* (Ray), *Mus avellanarius* (Linn.), *Sciurus avellanarius* (Desm.), *Myoxus Muscardinus* (Schreb.), *Myoxus avellanarius* (Desm.), *Le Muscardin* (Buff.), *Dormouse* (Penn.). He considers the specific name *Avellanarius* as not well chosen, inasmuch as the hazel-nut is not the principal food of the Dormouse; 'indeed,' he continues, 'I have never seen any that could gnaw through the shell of that nut when fully ripe and dry.'

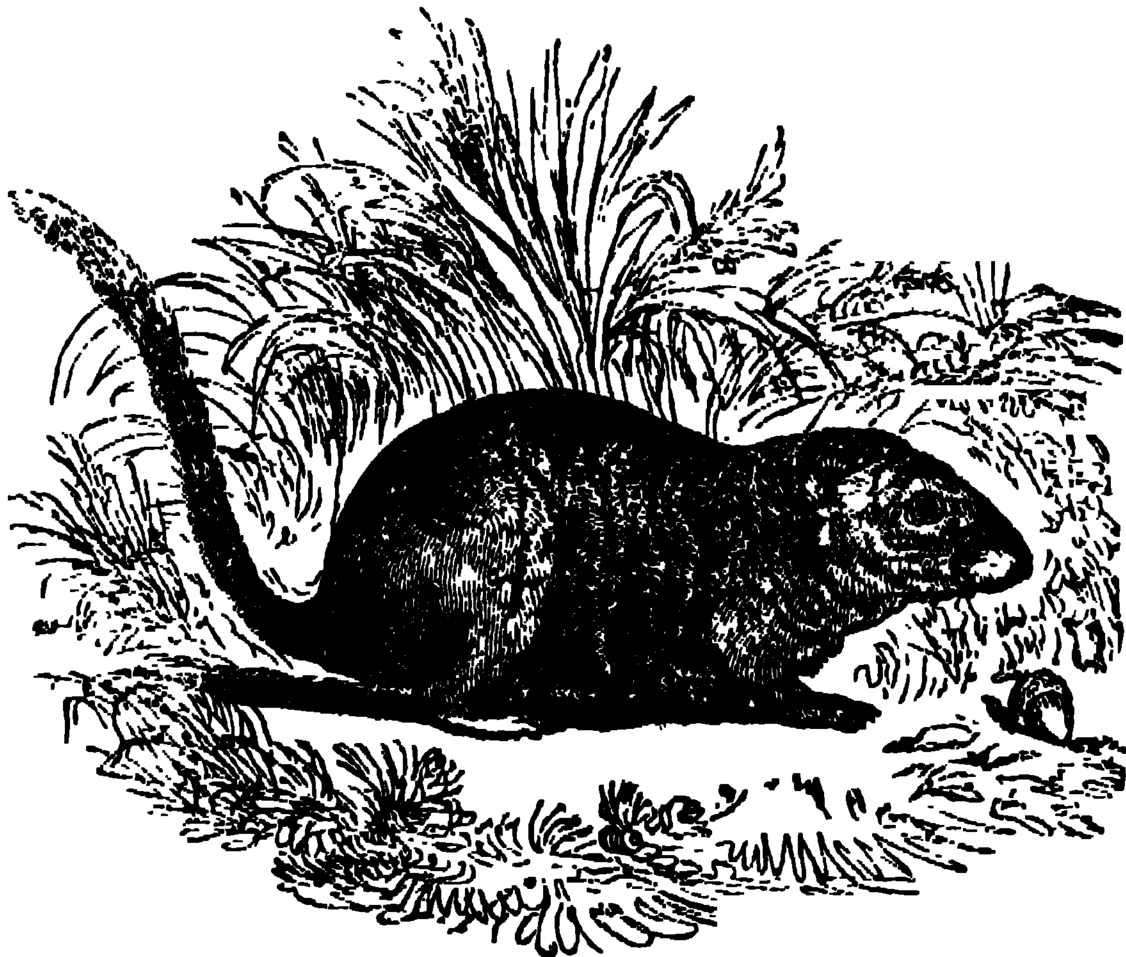
Habits, Food, &c.—Dense thickets, bushy dells, and tangled hedgerows are the favourite retreats of the Dormouse. There it constructs its easy dormitory, and there providently lays up its winter store, consisting of acorns, beech-mast, corn, young hazle-nuts, haws, &c. It seems inclined to be gregarious; and indeed Mr. Yarrell told Mr. Bell that he had seen not less than ten or a dozen, or even more, of their nests built in the shrubs of a thicket. The latter zoologist well describes its habits.

'It takes its food holding it in its hands, and sitting on its haunches like a squirrel,* and often suspending itself by its hind-feet, in which position it feeds as easily and comfortably as in the more ordinary position. Towards the winter it becomes exceedingly fat; and having laid up a store of food, retires to its little nest, and coiling itself up into a ball, with the tail over the head and back, becomes completely torpid. A mild day calls it into transient life; it then takes a fresh supply of food and relapses into its former slumber; and finally awakening in the spring, at which time it has lost much of its fat, it enters upon its usual habits, and the enjoyment of the conjugal and paternal affections. The young, which are generally about four in number, are born blind; but in a few days the eyes are opened, and in a short time they are enabled to seek their

* So do the Rats, both the black and brown species.

food independently of the parent's care. I have reason to believe that, in some cases at least, the Dormouse has a second brood early in the autumn, as I have received from one locality in the month of September an adult, one about half-grown, evidently of the spring brood, and three very young ones apparently not more than a fortnight or three weeks old.' (*British Quadrupeds.*) This pretty little animal is nocturnal in its habits. In *The Naturalist* (vol. iii.) will be found a well related instance of its behaviour on being aroused from its nap during the winter. One of them having been taken in its nest in the middle of December, the heat of its captor's hand and the warmth of the room completely revived it, and it nimbly scaled the furniture, finding no difficulty in ascending and descending the polished backs of the chairs, and leaping from chair to chair with great agility. On being set at liberty it sprang at least two yards to a table. It did not seem alarmed at being taken into the hand. In the evening it was placed with its nest in a box, and the next morning had relapsed into torpidity. Another account in the same volume informs us that a Dormouse, which had been sent a distance of 140 miles, was apparently but little disturbed by its ride. 'From that time till the 1st of April, 1838,' says Mr. Piggot, 'it slept in its snug dormitory, a deal box lined with wool, when it awoke and readily ate of apples and nuts. It is easily alarmed, being more timid than tame, but shows no signs of anger on being taken in the hand. As it sleeps the greater part of the day, I cannot then closely watch its habits; but towards evening it wakes up, and is very lively and frolicsome, running, on being let out of its cage, up the bell-rope, where it will sit for hours in the folds of the knot, timidly watching our movements.'

Geographical Distribution, Europe.



Dormouse.

Graphiurus. (F. Cuvier.)

Generic Character.—Limbs short, delicate, and not differing much from each other in length. Anterior feet terminated by four nearly equal toes, and with a flat nail on the internal tubercle of the palm, which indicates the thumb. Posterior feet with five toes, the two external, but the thumb principally, the shortest. All the toes armed with pointed, compressed, arched, and strong claws. Tail short, very fleshy, and seemingly thicker at its extremity than at its root. Molars eight in each jaw, remarkable for the comparative smallness of their size. The first in each jaw only a linear rudiment; the three following are a little smaller in the lower jaw than they are in the upper, equal in size to each other, with the surface of the crown united, and in this respect resembling those of the Aye-Aye; no figure was traceable, but this may have been from detrition.

Example, *Graphiurus Capensis.*

Description.—Eyes not so large as in *Myoxus*, with which the animal has much relationship; ears round. Fur thick; upper parts of the head, neck, shoulders, back, sides, rump, and upper part of the limbs deep brownish-grey; tip of the muzzle, sides, and lower part of the head and limbs reddish white; a large band of blackish brown from the eyes to below the ears; lower parts of the body greyish white with a reddish tinge; tail brown, grey, and whitish above, with its extremity entirely reddish white; there is a tuft of white hairs at the upper and anterior part of the base of the ear Size of the *Lerot*, Buff., *Mus quercinus*, Linn.

Habits unknown. (F. Cuv.)

Locality, Cape of Good Hope.

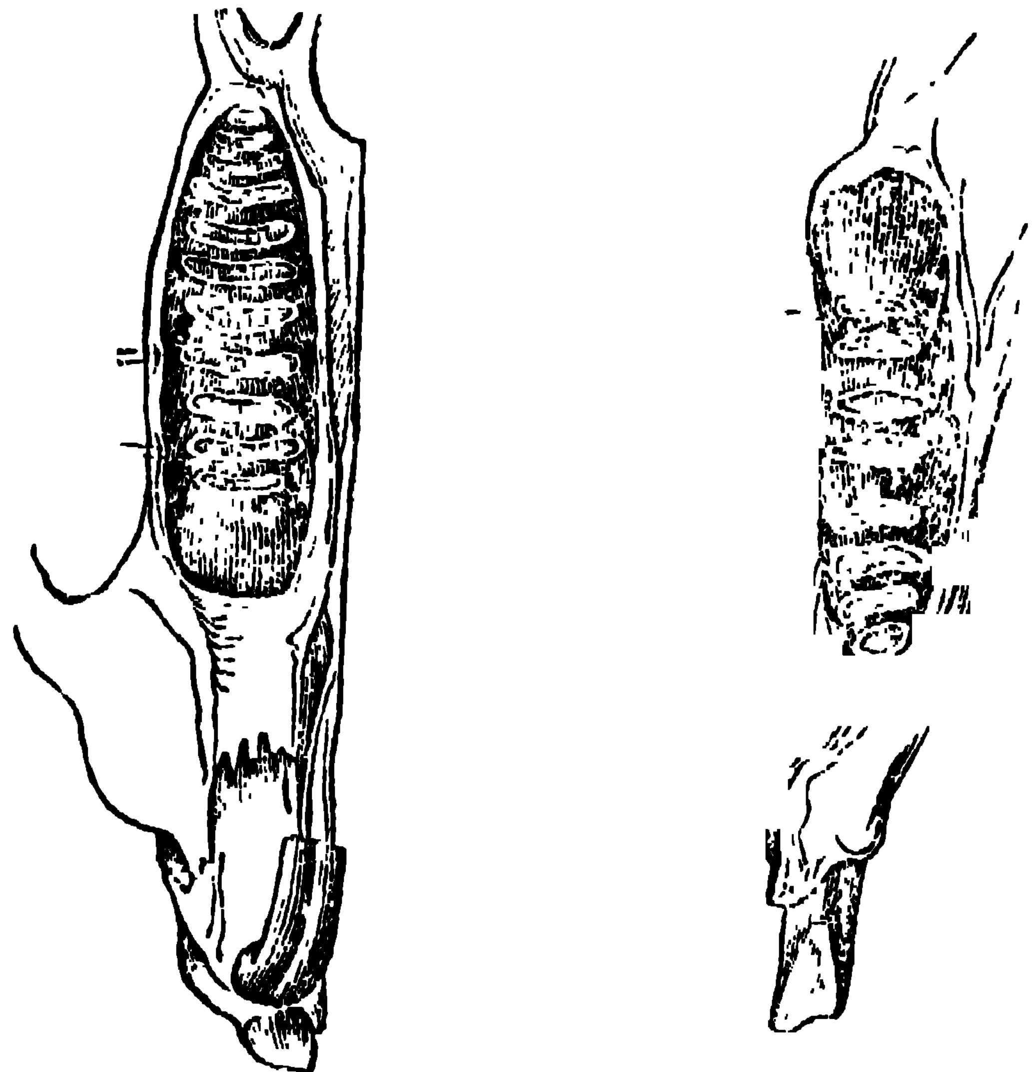


Graphiurus Capensis.

Otomys. (F. Cuvier.)

Delalande brought back from his voyage to the Cape of Good Hope two species of rodents remarkable for their physiognomy, which sufficiently resembles the rats, but differing externally from those animals in having their large ears covered with hairs, the head more rounded, and a short tail, and especially in their dentition.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{3-3}{3-3} = 16$



Teeth of Otomys. (F. Cuv.)

Example, *Otomys unisulcatus, Caffre Otomys.*

Description.—The anterior limbs have four complete toes, armed with delicate nails, which are compressed and sharp, and a rudiment of an unguiculated thumb; the posterior feet have five toes, armed with the same nails, but the two external ones are very short. The tail is but scantily covered with hairs, and is scaly and short. The muzzle is very thick and obtuse, entirely covered with hair, with the exception of a slight ridge round the nostrils, which are small, and approximated to each other below; the eyes are large, as well as the ears, which have an internal projecting membrane, which, when its edges (parois) are approximated, entirely shut the entrance of the auditory passage. The mouth is very small, the upper-lip cleft, and the tongue thick, short, and covered with soft papillæ. There are whiskers on the sides of the muzzle and above the eyes. The fur is thick, very soft, and consists of two sorts of hairs; the shortest and most numerous, which determine

the colour of the animal, are woolly, and, when viewed through a microscope, appear to be formed of very small rings, alternately bright and obscure; the others, rare and longer than the first, are also stouter and more stiff; these, when viewed through a microscope, present only a uniform texture, and so it is with the whiskers. The woolly hairs are of a slaty-grey for two-thirds of their length, and then of a yellowish-white, with the point black, whence results the dirty yellow tint with which the animal is coloured above; below, yellowish-white predominates. The very short hairs of the tail are of the colour of those of the back; the extremities have the tint of the under parts. Length about six inches (French), from the tip of the muzzle to the origin of the tail, which last measures three inches and a half. Mean height, two inches and a half. (F. Cuv.)

Habits, &c.—The habits of this species do not appear to be known, nothing respecting them having been found in the notes of M. Delalande. M. F. Cuvier thinks that it is doubtless omnivorous, like the rats; but from the size of its eyes, it may be conjectured that its life is not passed in such obscurity as theirs; and from the delicacy of its sharp claws, and the softness of its fur, that it does not burrow



Otomys unisulcatus.

Hydromys. (Geoffroy.)

Generic Character.—Muzzle rather pointed; ears small and rounded. Body covered with long hairs. Tail long, cylindrical, rather scaly, with scattered hairs. Four toes and the vestige of a thumb on the fore-feet. The hinder feet five-toed, and palmated for two-thirds of the length of the toes. Molars with the crowns divided into obliquely quadrangular lobes, the summits of which are hollowed into a spoon-shape.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{2-2}{2-2}$ = 12.

Example, *Hydromys leucogaster.*

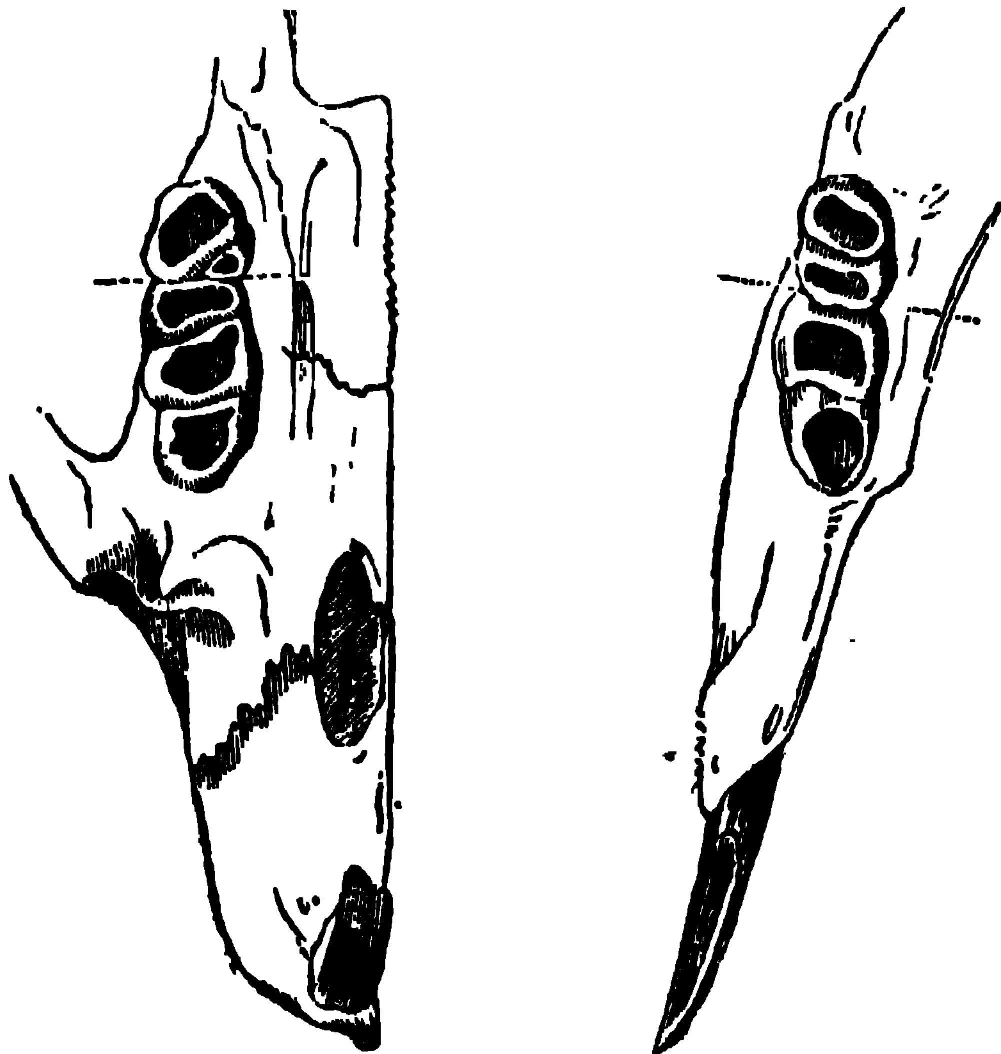
Description.—Fur short, soft, marone-brown above, white below; tail black at the base and white at the other extremity. Size sometimes twice that of the Common Brown Rat.

M. Geoffroy has recorded two species, that described above, and another with a yellow belly, *H. chrysogaster;* the last he states to be nearly one-half less than the *Coypou,* but they are generally considered to be only varieties of the same species. M. Geoffroy speaks highly of the quality of the fur of the yellow-bellied variety, and says that it is more valuable than that of the *Coypou.*

Habits, Locality, &c.—These animals are aquatic, and were found in the islands of D'Entrecasteaux Channel. That named *H. Chrysogaster* was killed by a sailor at the moment when it was taking refuge under a heap of stones: *H. Leucogaster* was taken in the island Maria, in the same channel.



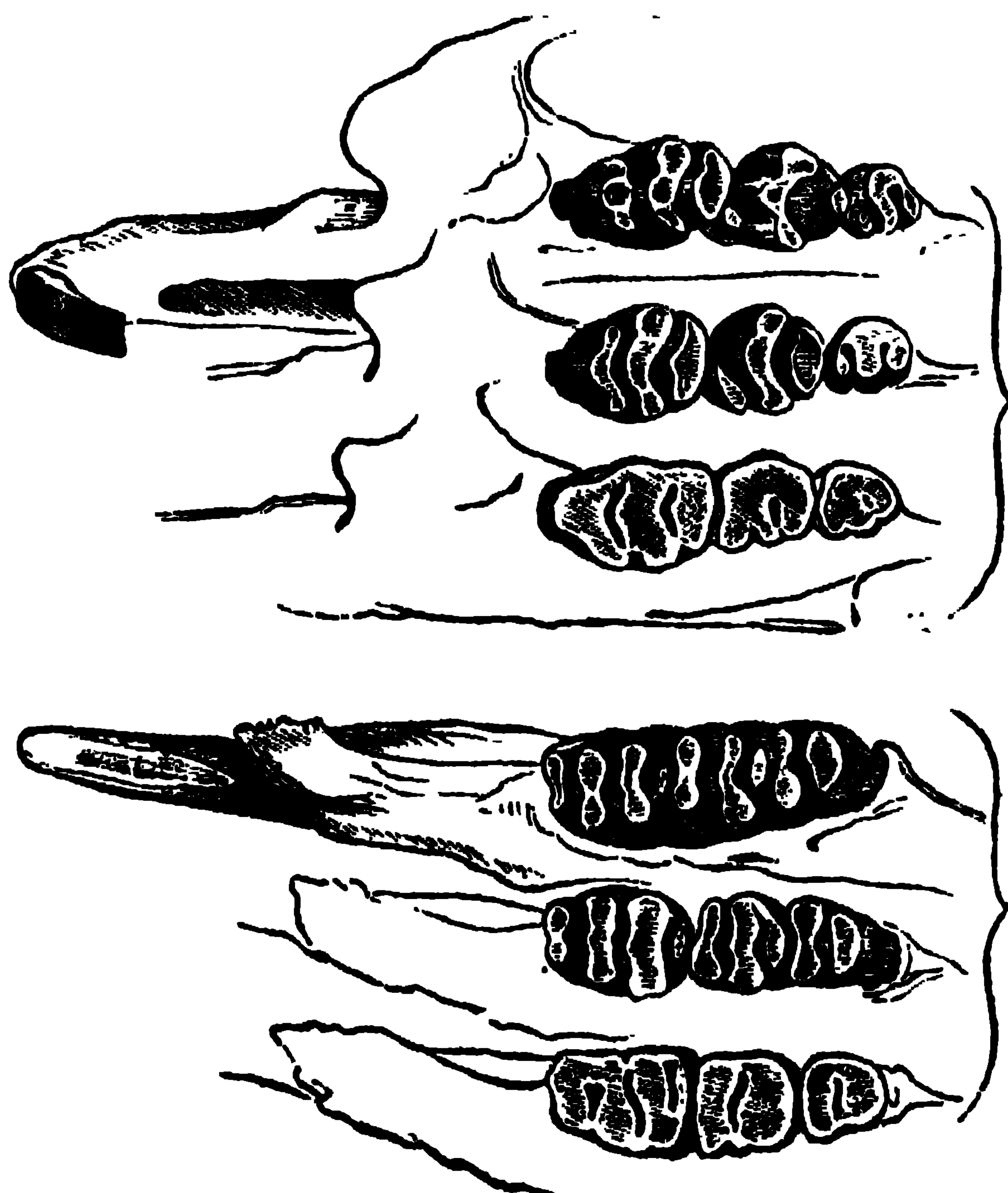
Hydromys leucogaster.



Teeth of Hydromys. (F. Cuv.)

True Rats and Mice.

M. F. Cuvier (*Dents des Mammifères*) observes that up to the time of his writing, animals provided with the same teeth as the Rat (*Mus Rattus*), the Brown Rat (*Surmulot* of the French—*Mus decumanus*), or the Mouse (*Mus Mus-*



Teeth of Mus.

ed s), formed a single and very natural genus. He then goes on to state that the possession of a cranium, the origin of which he knows not, in presenting the type of a new genus provided with the same teeth as the rat, confers on those teeth a more elevated rank than they had previously held, and begins to form the character of a family. The preceding is a copy of M. F. Cuvier's plate, and he informs us that the species which gave him this dentition are *Mus Rattus, Mus decumanus, Mus Musculus, Mus Pumilio*, &c.

In endeavouring to give a sketch of the swarms of this group, we shall treat of them according to their geographical distribution.

European Rats and Mice.

The Long-tailed Field Mouse, Wood Mouse, or *Mus sylvaticus*, and the Harvest Mouse, *Mus minimus* of White, and *Mus messorius* of Shaw, may be considered as indigenous in Europe. Whether the old English or Black Rat (Mus Rattus) and Domestic Mouse are aborigines, or imported, is not so clear. The latter is only found in inhabited countries; and, like the Black Rat and Brown Rats, is a cosmopolite, following civilized man wherever he is to be found.

The Long-tailed Field Mouse.—This is the *Llygoden ganolig* and *Llygoden y maes* of the antient British; *Le Mulot* of the French; and *Voed* of the Danes; *Mus sylvaticus* (Linn.), *Mus agrestis major* (Briss.), and *Mus domesticus medius* of Ray. The length of the head and body, as given by Mr. Bell, is 3 inches 8 lines, and that of the tail 3 inches and 6 lines. Pennant makes its measurement from the nose to the setting on of the tail four inches and a half, and the tail four inches. If the last mentioned dimensions are correct, they must have been taken from a very large individual. Mr. Macgillivray gives the dimensions of three individuals; the length (to the end of the tail) of the largest was 6 inches 8 lines, that of the next 6 inches 6 lines, and that of the least 6 inches only.

The animal is well described by Mr. Bell as larger than the Common Field Vole, but varying considerably in size; the head long and raised, the muzzle tapering; the whiskers very long; the eyes remarkably large and prominent; the ears large, oblong, oval, with the anterior margin turned in at the base, and a projecting lobe arising within the ear, near the base of the posterior margin; the tail nearly as long as the body, slender and tapering; the legs long. The upper part and sides of the head, neck, and body, and the outer surface of the legs, of a yellowish brown, darker on the back, each hair being grey or ash-coloured at the base, then yellow, and the tips of some of them black: under parts whitish, with a very slight greyish tint in some parts, and a yellowish grey patch on the breast. Tail brown above, white beneath. (*British Quadrupeds.*)

This is a most destructive species, and a bitter enemy to the horticulturist, the agriculturist, and the planter. It is very prolific, bringing forth from seven to ten at a birth, and is not always stinted to one brood in a year. The hoards that it collects in its subterranean retreats (which are sometimes the results of its own labour, but more frequently excavations which it finds ready made, but which it enlarges, such as those under roots of trees, old mole-runs, &c.) are enormous for the size of the animal, and Pennant is of opinion that the great damage done by hogs in rooting up the ground, or 'mooting,' as it is called in some counties, is caused chiefly by the search of the swine for the concealed treasure of this Field Mouse.

Geographical Distribution.—The whole of temperate Europe.

The *Harvest Mouse*. White, of Selborne, who suggests the name of *Mus minimus*, appears to be the first who drew the attention of naturalists to this the smallest of British quadrupeds. He wrote an account of it to Pennant, who called it the *Less long-tailed Field Mouse* and the *Harvest Mouse*. It is the *Mus messorius* of Shaw, and Mr. Bell adds the following synonyms:—*Mus minutus* (Pall.)—*Mulot nain?* and *Rat des Moissons* (F. Cuv., 'Mamm.'); *Minute Mouse* of Shaw.

Description, Food, Habits, &c.—White thus introduces his discovery to Pennant: 'I have procured some of the mice mentioned in my former letter, a young one and a female with young, both of which I have preserved in brandy. From the colour, size, shape, and manner of nesting, I make no doubt but that the species is nondescript. They are much smaller and more slender than the *Mus domesticus medius* of Ray, and have more of the squirrel or dormouse colour; their belly is white; a straight line along their sides divides the shades of their back and belly. They never enter into houses; are carried into ricks and barns with the sheaves, abound in harvest, and build their nests amidst the straws of the corn above the ground, and sometimes in thistles. They breed as many as eight at a litter, in a little round nest composed of the blades of grass or wheat. One of these I procured this autumn most artificially platted, and composed of the blades of wheat, perfectly round, and about the size of a cricket-ball; with the aperture so ingeniously closed, that there was no discovering to what part it belonged. It was so compact and well fitted that it would roll across the table without being decomposed, though it contained eight little mice that were naked and blind. As this nest was perfectly full, how could the dam come at her litter respectively so as to administer a teat to each? Perhaps she opens different places for that purpose, adjusting them again when the business is over; but she could not possibly be contained herself in the ball with her young, which moreover would be daily increasing in bulk. This wonderful procreant cradle, an elegant instance of the efforts of instinct, was found in a wheat-field suspended in the head of a thistle.' And again: 'As to the small mice, I have further to remark, that though they hang their nests for breeding up amidst the straws of the standing corn above the ground, yet I find that, in the winter, they burrow deep in the earth, and make warm beds of grass; but their grand rendezvous seems to be in corn-ricks, into which they are carried at harvest. A neighbour housed an oat-rick lately, under the thatch of which were assembled near an hundred, most of which were taken, and some I saw. I measured them, and found that from nose to tail they were just two inches and a quarter, and their tails just two inches long. Two of them, in a scale, weighed down just one copper halfpenny, which is about the third of an ounce avoirdupois; so that I suppose they are the smallest quadrupeds in this island. A full-grown *mus medius domesticus* weighs, I find, one ounce lumping weight, which is more than six times as much as the mouse above; and measures from nose to rump four inches and a quarter, and the same in its tail. . . . As my neighbour was housing a rick, he observed that his dogs devoured all the little red mice they could catch, but rejected the common mice; and that his cats ate the common mice, refusing the red.' Thus far White. Dr. Gloger describes one of these nests as beautifully constructed of the panicles and leaves of three stems of the common reed interwoven together, and forming a roundish ball, suspended on the living plants about five inches from the ground. On the side opposite the stems, rather below the middle, was a small aperture, which appeared to be closed during the absence of the parent, and was scarcely observable even after one of the young had made its escape through it. The inside, when examined with the little finger, was found to be soft and warm, smooth, and neatly rounded, but very confined; it contained only five young; but another less elaborately formed sheltered no less than nine. The panicles and leaves were slit into minute strips or strings by the teeth of the animal in order to assist the neatness of its weaving. Mr. Macgillivray found one of these nests in Fifeshire composed of dry blades of coarse grass, arranged in a globular form, and placed in the midst of a tuft of *Aira cæspitosa*, nine inches from the ground: it contained six or seven young naked and blind. The food of this little mouse consists of corn and grass seeds, insects, and earth-worms: one to which a bit of the tail of a dead blind worm, *anguis fragilis*, was presented, devoured it greedily. Of insects it is very fond. Mr. Bingley says, 'One evening, as I was sitting at my writing-desk, and the animal was playing about in the open part of its cage, a large blue fly happened to buzz against the wires. The little creature, although at twice or thrice the distance of her own length from it, sprang along the wires with the greatest agility, and would certainly have seized it, had the space between the wires been sufficiently wide to have admitted her teeth or paws to reach it. I was surprised at this occurrence, as I had been led to believe that the Harvest Mouse was merely a granivorous animal. I caught the fly and made it buzz in my fingers against the wires. The mouse, though usually shy and timid, immediately came out of her hiding-place, and running to the spot, seized and devoured it. From this time I fed her with insects whenever I could get them; and she always preferred them to every other kind of food that I offered her.' Mr. Mac-

gillivray figures one in the coils of an earth-worm, which it devoured, though the worm at first upset it by twisting round its body. (*Naturalist's Library—Mammalia*, vol. vii.; *British Quadrupeds*, pl. 27.)

Col. Montagu failed to keep it in confinement, but it has been so kept. The Rev. W. Bingley and Mr. Broderip observed that the tail is in a degree prehensile. The latter had a pair in a dormouse's cage for some time, and frequently saw them coil the end of their tails round the bars, especially when they were clambering along the sides or on the top of it. They became very familiar, soon recognised their friends, and would lie down or rear themselves up to be tickled with a straw or a pen; an operation which they evidently enjoyed much. We know of no instance when the female has brought forth in confinement where she has not eaten her young. One just born that was saved from the teeth of the mother is in the Museum of the Royal College of Surgeons, and is perhaps one of the smallest placental quadrupeds that ever breathed.

Geographical Distribution.—Europe, perhaps generally. It has been found in Siberia, Russia, and Germany. In Britain it is recorded as having occurred in Hampshire, Gloucestershire, Wiltshire, and Devonshire; in the three last counties by Col. Montagu, and noted as not uncommon. It has been found also in Cambridgeshire. Mr. Macgillivray had one sent to him from Aberdeenshire, and another from the neighbourhood of Edinburgh: he found, as we have seen, the nest in Fifeshire.



Harvest Mouse: nest in background.

There are, it appears, in Trebizond, mice (*Mus Alleni* and *Mus Abbottii*) smaller than *Mus messorius*. (*Zool. Proc.*, 1837.)

We shall here notice those cosmopolites, the *Black Rat*, the *Brown Rat*, and the *Common Mouse*, the pests of civilised man.

The Black Rat. This is *Le Rat* of the French; *Ratto* and *Sorico* of the Italians; *Raton* and *Rata* of the Spaniards; *Rato* of the Portuguese; *Ratze* of the Germans; *Rot* of the Dutch · *Rotta* of the Swedes; *Rotte* of the Danes; *Llygoden ffrengig* of the antient British; *Black Rat* of the modern English; and *Ratton* of the Scotch. It is the *Mus Rattus* of Linnæus, and the *Mus domesticus major* of Ray.

That this animal is indigenous may be doubted. Mr. Macgillivray observes that the 'Old English or Black Rat,' as it has been called, is as much French or Irish as English. That it was in Britain long before the introduction of the *Brown Rat*, before whose superior strength it is rapidly disappearing, can be doubted as little. Pennant, who gives the British name above stated for the *Black Rat*, has no British name for the brown species; and we suspect that the king's rat-catcher, noticed by Pennant, with his scarlet dress embroidered with yellow worsted, on which are figures of mice or rats destroying wheat-sheaves, owed his office in this kingdom to the *Black Rat*. 'It is believed,' says Mr. Macgillivray, 'to have been originally imported from the Continent, where it first made its appearance in the beginning of the sixteenth century, and is supposed to have come from the East. Vessels in port were formerly liable to be infested by it, so that it soon became as common in America as in Europe; although in the maritime parts of that country it has now become nearly as scarce as with us, and from the same cause, the predominance of the more enterprising and stronger Brown Rat.' Mr. Bell had previously fixed the middle of the same century for its appearance in this country. 'At least,' says he, 'no author more antient than that period has described or even alluded to it, Gesner being the first who described and figured it.' The figure of Gesner leaves no doubt that the animal represented is the *Black Rat*, and it is spoken of in such terms that it may well have been a long resident in England:—'Mus domesticus major, quem Rattum appellârim cum Alberto, quoniam hoc nomine non Germani tantum, sed Itali etiam, Galli et Angli utuntur;' and again, among the names given to the animal by various nations, 'Anglicè, *Rat, Ratte*.' Shakspere's lines,

> 'But in a sieve I'll thither sail,
> And, like a Rat without a tail,
> I'll do—I'll do—and I'll do!'

show that the animal must have been familiarly known to his audience; and it must have been very common early in the seventeenth century, when the white variety was probably well known; for we read in the 'Dysart Kirk Session Minutes' (May, 1626), that a suspected witch, one Janet, came to John White's house, 'and span on his wife's wheel in her absence, and thereafter there came a *white Ratton* at sundrie times and sat on his cow's back, so that thereafter the cow dwined away.' Mr. Bell notices the usurpation of the haunts of this species by the Brown Rat. The Black Rat, he says, 'is now rarely found, excepting in old houses of large cities, as in London, in Edinburgh, and some other places, where it still exists in considerable numbers, especially in the cellars and stables of the city of London, in many of which it is more common than the other.' Mr. Macgillivray remarks that in Edinburgh it appears to be completely extirpated. 'I have not,' he continues, 'seen a specimen obtained there within these fifteen years.' The last-mentioned author also tells us that the Rev. Mr. Gordon, minister of Birnie, some years ago sent him several individuals alive, which were caught in Elgin, where however the species is much less frequently met with than the Brown Rat. In Leith, he says, which is at a greater distance from the coast, it is not very uncommon; and in other inland towns and villages in Scotland it is still to be procured. 'Whether,' adds Mr. Macgillivray, 'the destruction of this animal has been effected by the larger and more ferocious Brown Rat, or, like that of many tribes of the human species, has resulted from the diminution of food, caused by the overwhelming increase of an unfriendly race, it is impossible to determine.'

The Black Rat is greyish black above and ash-coloured beneath; the ears are half the length of the head, and the tail is rather longer than the body.

Mr. Bell gives the following dimensions:—

	Inch.	Lines.
Length of the head and body .	7	4
Length of the head . . .	1	10
Length of the ears . . .	0	11
Length of the tail . . .	7	11

It breeds often in the year, and the female ordinarily produces from seven to nine at a birth. Like the Brown species, it is omnivorous. Mr. Bell thinks it probable, from the proximity of the two countries, that it was introduced into this kingdom from France, and observes that the Welsh name for it, which signifies 'French Mouse,' appears to favour this opinion. From Europe, he adds, it has been sent with the Brown Rat to America, the islands of the Pacific, and to many other places.

Mr. Thompson (*Zool. Proc.*, 1837) notices an Irish Rat with a white breast, which he is inclined to consider distinct from *Mus Rattus*, and which he names *Mus Hibernicus*.

Dr. Richardson did not observe the *Black Rat* in the Fur Countries; and he says that he may venture to affirm that

it had not, when he wrote, advanced farther north than the plains of the Saskatchewan.

Brown Rat. This is *Le Surmulot* of the French; *Norway Rat* of the English; *Mus decumanus* of Pallas and Gmelin; and *Mus Norvegicus* of Brisson.

Why this overwhelming pest has obtained the name of *Norway Rat* does not appear: so far from its being aboriginal in that country, it was not known to exist there when the name was first applied to it. 'It is,' says Pennant, 'an animal quite unknown in Scandinavia, as we have been assured by several natives of the countries which form that tract, and Linnæus takes no notice of it in his last 'System.' It is fit here to remark an error of that able naturalist in speaking of the common Rat, which he says was first brought from America into Europe by means of a ship bound to Antwerp.* The fact is that both Rat and Mouse were unknown to the New World before it was discovered by the Europeans, and the first Rats it ever knew were introduced there by a ship from Antwerp. This animal never made its appearance in England till about forty years ago..... I suspect that this Rat came in ships originally from the East Indies. They are found there, and also in vast numbers in Persia, from whence they have made their way westerly even to Petersburg.' It made its appearance in the neighbourhood of Paris about 1750. Mr. Bell states that the original country of this Rat can no longer be ascertained, although there is reason to believe that it comes from a warmer climate than our own. Mr. Macgillivray says that it is supposed to have been introduced from Persia and the East Indies about 1730, and gradually to have spread over the greater part of the continent of Europe, as well as America, by means of the frequent commercial intercourse established among the nations of these regions. It is not, he observes, confined to cities and villages, but establishes colonies in farm-steadings, on the banks of canals and rivers, and even in islands at a considerable distance from the mainland, or from larger islands, to which it has been introduced by shipping. Thus, he states, it is found on many of the islets of the Hebrides in considerable numbers, feeding on grass, shell-fish, and crustacea, and burrowing in the banks; 'for although not essentially amphibious, like the Water Rat, it does not hesitate on occasion to betake itself to the water, and flocks have been seen swimming from one island to another.'

According to Dr. Harlan the *Brown Rat* did not make its appearance in North America until the year 1775. When Dr. Richardson wrote (*Fauna Boreali-Americana*) it was very common in Lower Canada; but he was informed that, in 1825, it had not advanced much beyond Kingston in Upper Canada. He did not observe it in the Fur Countries; and if it does exist there, he thinks that it is only at the mouth of the Columbia river, or at factories on the shores of Hudson's Bay.

This species is eminently carnivorous, bold, ferocious, and most destructive in the game-preserve and poultry-yard, where the eggs and young birds are preyed upon by them without mercy. In towns carrion and offal form their chief subsistence. An official report to the French government on the proposition for removing the establishment for slaughtering horses at Montfauçon gives an account of their numbers and voracity almost appalling; indeed one of the chief arguments against the removal was the danger to the neighbourhood of suddenly depriving these voracious animals of their usual food. The carcasses of the slaughtered horses, sometimes to the amount of thirty-five per diem, are found next morning picked to the bare bone by the rats. A part of this establishment is enclosed by solid walls, at the bottom of which several holes are made for the entrance and exit of these vermin. Into this place Dusuassois, the proprietor, put the dead bodies of two or three horses; and having stopped up all the holes towards midnight, with as little noise as possible, he, with several workmen, each bearing a torch in one hand and a stick in the other, suddenly entered the enclosure, shut the door, and began a general massacre. Wherever a blow was directed, even without aim, a rat was killed; and those which attempted to escape by running up the walls were quickly knocked down. The dead of one night amounted to 2650; the result of four hunts was 9101; and by repeating the experiment at intervals of a few days, Dusuassois destroyed 16,050 rats in the space of a month. Now when it is recollected that the yard in which these numbers were killed does not contain more than a twentieth of the area over which the dead horses are spread, some idea may be formed of the multitudes that infest this place; indeed the adjoining fields and eminences are riddled with their burrows, and their paths thereto may be traced from the enclosures where the horses are slaughtered.

This rat is greyish-brown above and greyish-white beneath, and the tail is shorter than the head and body. Mr. Bell gives the following dimensions, from which its superiority in size to the Black Rat will be evident:—

	Inches.	Lines.
Length of the head and body . .	10	8
" head	2	4
" ears	0	8
" tail	8	2

White or yellowish-white varieties, being albinoes with red eyes, and variegated individuals, sometimes occur.

The *Common* or *Domestic Mouse* needs no description. It seems to be entirely dependent on civilized man, and has never been found at a distance from his dwelling. White varieties with pink eyes are kept and propagated as pets by those who admire such albinoes: they are pretty little animals, and soon become familiar. This well-known species is *La Souris* of the French; *Topo, Sorice,* and *Sorgio di Casa* of the Italians; *Rat* of the Spanish; *Ratinho* of the Portuguese; *Maus* and *Hausmaus* of the Germans; *Muys* of the Dutch; *Mus* of the Swedes; *Muus* of the Danes; *Llygoden* of the antient British; *Mus domesticus communis vel minor* of Gesner; *Mus domesticus vulgaris s. minor* of Ray; and *Mus Musculus* of Linnæus.

Dr. Richardson saw a dead mouse in a storehouse at York Factory filled with packages from England, and he thinks it probable that the species may have been introduced into all the ports on the shores of Hudson's Bay; but he never heard of its being taken in the Fur Countries at a distance from the sea-coast. Mr. Say informed him that it was introduced at Engineer Cantonment on the Missouri, by Major Long's expedition.

Asiatic Rats and Mice.

It seems to be certain that the *Brown Rat* is an Asiatic species, and the Black Rat is not without claims to a similar geographical origin; but among the most formidable of the Oriental Rats is the *Mus Giganteus* of Hardwicke, *Mus Malabaricus* of Shaw. Of this rat General Hardwicke gives a faithful figure, of the size of life, in the seventh volume of the *Transactions of the Linnean Society:* it has the appearance of a *Brown Rat* dilated to gigantic proportions, and it is impossible to look at it without thinking what the consequences might be if it were ever to be imported and naturalised in Europe. Above it is most hairy and black; beneath inclining to grey. The animal figured was a female, and weighed two pounds eleven ounces and a half. Its total length was 26½ inches, of which the tail measured 13 inches. The male grows larger, and weighs three pounds and upwards. 'This rat,' writes the late lamented General, 'is found in many places on the coast of Coromandel, in Mysore, and in several parts of Bengal between Calcutta and Hurdwar. It is partial to dry situations, and hardly ever found distant from habitations. The lowest caste of Hindus eat the flesh of this rat, in preference to that of any other species. It is a most mischievous animal, burrows to a great depth, and will pass under the foundations of granaries and storehouses, if not deeply laid. Mud, or unburnt brick walls, prove no security against its attacks, and it commonly perforates such buildings in all directions. It is destructive in gardens, and roots up the seeds of all leguminous plants sown within its haunts. Cucurbitaceous plants and fruits also suffer by its depredations. When grain and vegetables are not within its reach, or scarce, it will attack poultry; but the former is its choicest food.' Mr. Gray remarks that the geographical range of *Mus giganteus* appears to be very extensive, Mr. Charles Hardwicke having transmitted to the British Museum a specimen from Van Diemen's Land.

Mus Setifer. (Horsf.) The *Tikus-wirok* of the Javanese was considered by M. Temminck and others to be the young of this species: but this opinion is corrected by Mr. Gray (*Zool. Proc.*, 1832), who points out the differences. Dr. Horsfield states that it is found in Java at the confines of forests and woods, and, according to his observations, rarely approaches the villages and dwellings of the natives, who describe it, however, as a bold and mischievous animal, and

* N. B. Linnæus only mentions this on the authority of another. His words are: 'Ex America navi quadam Antwerpiana primum in Europam pervenisse refert Poppin. orb. illustr. 196.'

the Doctor says, that the robustness of its form and the remarkable size and strength of its front teeth agree with this character: its nose, he adds, is evidently employed in burrowing the ground in search of its food, and its tail has the character of those species which are in the habit of frequenting the water. Mr. Hodgson states that *Mus decumanus* and *Mus Rattus* are both very numerous and troublesome in Nepâl; that *Mus Musculus* is very uncommon, and that *Field Mice* are frequently met with.

African Rats and Mice.

Mus Barbarus, the *Barbary Mouse*, will serve as an example of the African species.

Description.—Darkish brown with five or six yellowish longitudinal stripes on each side, about half as wide as the intervening spaces, and becoming confused towards the under parts, which are nearly white. Mr. Bennett observes, that on the fore-feet only three of the toes are at first visible; and that this circumstance, mentioned in the specific character given by Linnæus, has led many subsequent naturalists to doubt whether the *Barbary Mouse* really belonged to the genus with which it was associated. Linnæus himself, continues Mr. Bennett, had however stated, in his description of the species, that rudiments of a thumb, and also of a fifth toe, were observable on a closer inspection; and this statement, he adds, was fully confirmed by the examination of the specimens in the Menagerie of the Zoological Society of London, which were intermediate in size between the Common Rat and Common Mouse.

Locality, Barbary, where they are not rare, and where the name given to them by the natives is *Phăr-Azĕff*, the *Palmetto Mouse*.



Barbary Mouse.

American Rats and Mice.

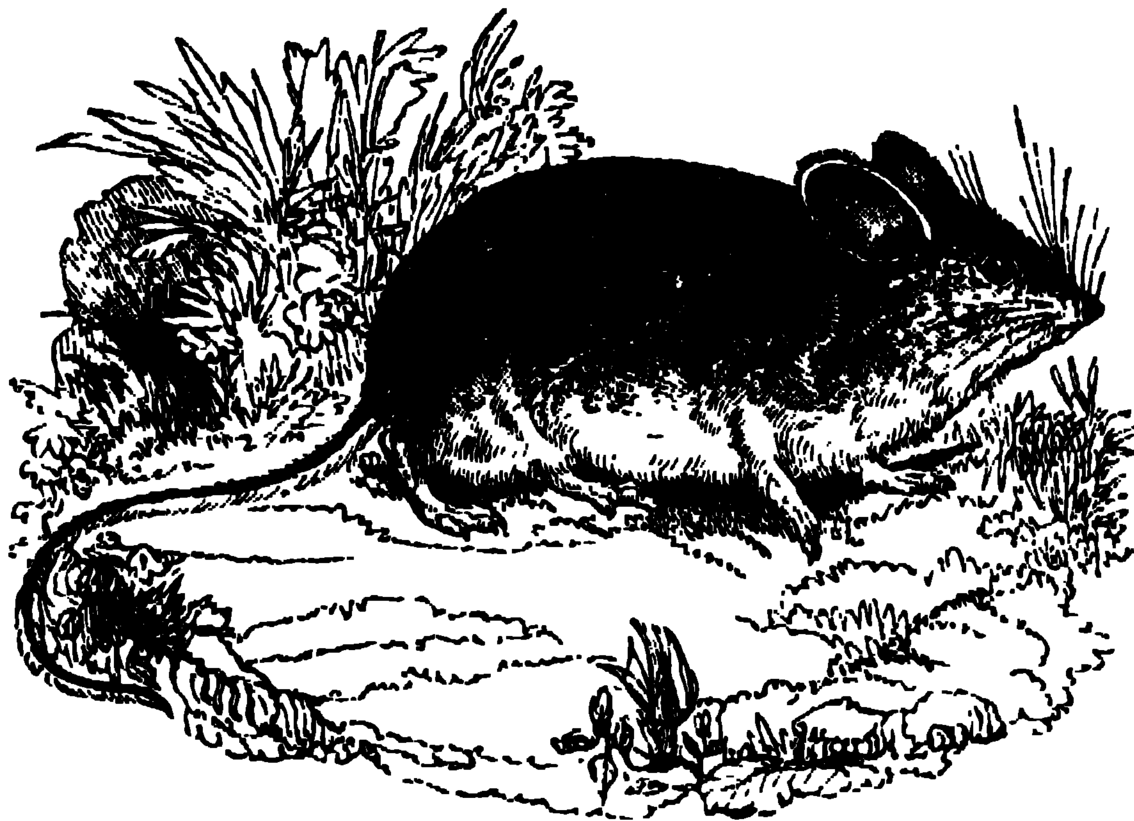
Some of the best examples of the forms of American Mice will be found in the 'Zoology of H. M. S. Beagle,' where many species are figured: they were collected by Charles Darwin, Esq., at various parts of the southern coast of South America, viz., Coquimbo, Valparaiso, Port Desire, Maldonado, Bahia, Blanca, &c. Mr. Waterhouse first described these in the Proceedings of the Zoological Society of London (1837), dividing them into several subordinate groups, to which he assigns the subgeneric titles of *Scapteromys*, *Oxymycterus*, *Abrothrix*, *Calomys*, and *Phyllotis*, which last, in Mr. Waterhouse's opinion, indicates an aberrant form of the *Muridæ*.

We select as an example *Mus (Phyllotis) Darwinii*.

Description.—Fur above, cinnamon and blackish intermixed; in front of the eyes, ash-colour; cheeks, sides, and tail, near the base, yellow cinnamon; under parts and feet white; ears very large and leaf-like, nearly naked; the tail, which is nearly equal to the head and body, blackish brown above, white beneath. Length from the tip of the nose to the end of the tail 10 inches, 9 lines, of which the tail measures 4 inches, 9 lines.

Locality, Coquimbo.

Mr. Waterhouse also characterises from the same collection two new genera of small Rodents, *Reithrodon* and *Abrocoma*. The affinity of the first is stated to be with the *Muridæ*, and the second Mr. Waterhouse considers to be evidently allied on the one hand to *Octodon*, *Ctenomys*, and *Poephagomys*, and on the other to the *Chinchillidæ*. See further, post, 518.



Mus Darwinii.

Before we take leave of this part of the subject, we must refer to an observation of Mr. Gray, who remarks (*Zool. Proc.*, 1832) that the comparative length of the hinder feet, and the relative distance of the tubercles of the sole from the end of the toes and from the heel, appear to furnish very good distinctive characters for the species of this difficult genus. Thus in the *Wood Mouse*, *Mus sylvaticus*, the hinder tubercle of the sole is about a line nearer to the heel than to the end of the toes, while in the *Common Mouse*, *Mus Musculus*, which has a shorter hind foot, the hinder tubercle is nearly equidistant between the heel and the tip of the toes.

Mr. Darwin (*Journal* and *Remarks*) observes that mice, and other small rodents, subsist in considerable numbers in very desert places, as long as there is the least vegetation. In Patagonia, even on the borders of the Salinas, where a drop of fresh water can never be found, they swarm. Next to Lizards, he adds, mice appear to be able to support existence on the smallest and driest portions of the earth, even on the islets in the midst of great oceans. He believes it will be found, that several islands, which possess no other warm-blooded quadruped, have small rodents peculiar to themselves. Sir Woodbine Parish (*Buenos Ayres*, &c.) states, that after the great drought of 1830, 1831, and 1832, there was a prodigious increase of all kinds of vermin, especially field mice, myriads of which overran the country, and entirely destroyed the maize harvest of 1833.

Capromys. (Desmarest; *Isodon*, Say.)

Generic Character.—Fore-feet four-toed; thumb rudimentary. Hind-feet strong, thick, five-toed. Tail moderate, thick at the base, scaly, with few hairs. Molars prismatic, with their crown traversed by folds of enamel, which penetrate rather deeply, and resemble those in the crown of the teeth of the Beavers.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.



a, muzzle; *b*, portion of tail enlarged to show its scales and hairs; *c*, under part of fore-foot; *d*, under part of hind-foot of Capromys.

Example, *Capromys Furnieri*, Desm.; *Isodon pilorides*, Say.

Description.—Size of a rather small rabbit. Fur coarse, greenish or blackish brown, tinged with specks of obscure yellow above, except on the rump, where the hairs are stiffer

and which is reddish-brown; belly and chest dirty brownish-grey: muzzle and feet blackish.

Habits, &c.—M. Desmarest was presented with two males from Cuba by M. Fournier. Of the habits of these animals in the wild state, the latter knows only that they are found in woods, that they climb trees with great facility, and that they live on vegetables. In the domesticated state, M. Desmarest remarked that their intelligence appeared to be developed as much as that of rats and squirrels, being much beyond that of rabbits and Guinea pigs. They showed great curiosity, and were very wakeful at night, but their sense of hearing did not seem so fine as that of rabbits and hares. Their nostrils were incessantly in motion, especially when they smelt any new object, and their taste was sufficiently delicate to enable them to distinguish and reject vegetables which had been touched by animal substances, which last appeared to be odious to them. They agreed well, sleeping close together, and, when they were apart, they called to each other with a sharp cry differing little from that of a rat: they expressed pleasure by a low soft kind of grunting. They hardly ever quarrelled, except for food, as when one piece of fruit only was given between both; one would then seize it and run away till the other was able to take it from him. They sometimes played for a long time together, holding themselves up in the manner of kangaroos, firmly supported upon the broad soles of their feet and the base of the tail, and striking each other with the hands, until one of them finding a wall or some other body against which to support himself, acquired additional power and gained advantage, but they never bit each other. They manifested the greatest indifference to other animals, paying no attention even to cats. They were fond of being caressed, and particularly of being scratched under the chin. They did not bite, but slightly pressed with the incisive teeth the skin of those who caressed them. They did not ordinarily drink, but M. Desmarest saw them occasionally suck up water as squirrels do. Their food was solely vegetable, such as cabbage, succory, grapes, nuts, bread, apples, &c. &c.; and they were not very difficult in their choice of it, though they were very fond of highly flavoured herbs and aromatic plants,—wormwood, rosemary, pimpernel, geraniums, celery, &c., for instance. Grapes too pleased them mightily, and to obtain the fruit they climbed up a long pole on which it was placed: they were fond of bread steeped in aniseed or wine. Their excrements were long black lumps similar in consistence to that of rabbits. Their urine reddened, in drying, white linen wetted with it.



Capromys Furnieri.

They were almost absolutely plantigrade, and their movements were slow, the hinder parts appearing to be embarrassed, as it were, when they walked, as may be observed in the bear. They took occasional leaps, suddenly turning round from head to tail, like the field mouse, and galloped, when at play, making a considerable noise with the soles of their feet. They climbed with ease, assisting themselves with their tails as a support and using the same in descending. In certain positions, on a stick for example, the tail served as a balance to preserve equilibrium. They often raised themselves to a listening posture, sitting erect, with the hands hanging down, like rabbits and hares; and, in eating, they employed, sometimes both, at other times one of their hands only. The latter happens when the substance they are holding is small enough to be held between their fingers and the tubercle at the base of the thumb.

This species appears to be known in Cuba by the name of *Utia*, and M. Desmarest thinks that it is the animal described by Bomare, Oviedo, and others, more than 300 years since. According to Bomare, the Utias is a species of rabbit of the size of a rat, which inhabits the West Indies, and is hunted at night by the light of a luminous insect, named *Acadia* (probably *Elater noctilucus*), of which M. Fournier brought large quantities from Cuba.

Another species, also from Cuba, *Capromys prehensilis* (Pöppig), is also recorded, but Dr. Fischer places the mark of doubt before it.

For Mr. Owen's observations on the comparative anatomy of *Capromys* see the *Zool. Proc.* for 1832 and 1835.

Cricetus [HAMSTER]. And see further, p. 518.

Jumping Mice.

The race of Jerboas, or *Dipodidæ*, appears to be ordained by nature for living upon desert and sandy plains.

Schreber, and he was followed by Gmelin and others, appears to have been the first who characterised the genus *Dipus*.

Mr. Gray (*Annals of Philosophy*, 1825) makes the *Jerboïdæ* the fourth family of the *Glires*, and thus characterises it: cutting-teeth two in each jaw; grinders simple or compound, rooted; ears moderate; eyes large, prominent; clavicles distinct; fore feet short (used as hands); hind feet very long; tail long, hairy, used in leaping or walking; fur soft. And he thus divides the family—

†

Grinders compound or rootless.

1. *Pedestina.* Pedestes, *Illig.* 2. *Dipina.* Dipus, *Schreb.* Meriones, *F. Cuv.*, not *Illig.*

††

Grinders simple, roots divided; legs nearly equal.

3. Gerbillus, *Desm.* 4. *Myoxina.* Myoxus, *Gm.* 5. *Sciurina.* Sciuropterus, *F. Cuv.* Pteromys, *Cuv.* Macroxus, *F. Cuv.* Sciurus, *Linn.* Tamia, *Illig.* The latter genus very closely allied to *Arctomina.*

Mr. Swainson (*Classification of Quadrupeds*) observes that the Jerboas (*Dipus*) are remarkable for possessing the longest hind legs of any quadrupeds yet discovered, while the fore legs are disproportionally short; this structure he remarks is seen also in the Kangaroos, which seem to be represented in miniature by these little animals, which, 'like their pouched prototypes, use the fore feet only as organs of rest upon the ground; for if they are frightened or wish to proceed at a quick pace, they stand upon the hind legs only, and take prodigious leaps.' That the tail is necessary for the efficient performance of these feats, is proved by the fact that individuals deprived of their tails were unable to assume the erect position or to leap at all. The fore feet are employed in conveying food to the mouth, and seem to be of little or no use as organs of progression. Those that we have seen alive seemed to use their posterior extremities only as organs of locomotion, and appeared to walk on the toes of those extremities. They are very bird-like in some of their movements, and there is something in their general appearance that would lead an imaginative mind to the fancy that they were birds suddenly transformed to quadrupeds and were hardly reconciled to the change. Parts of their internal structure, in the skeleton particularly, are bird-like.

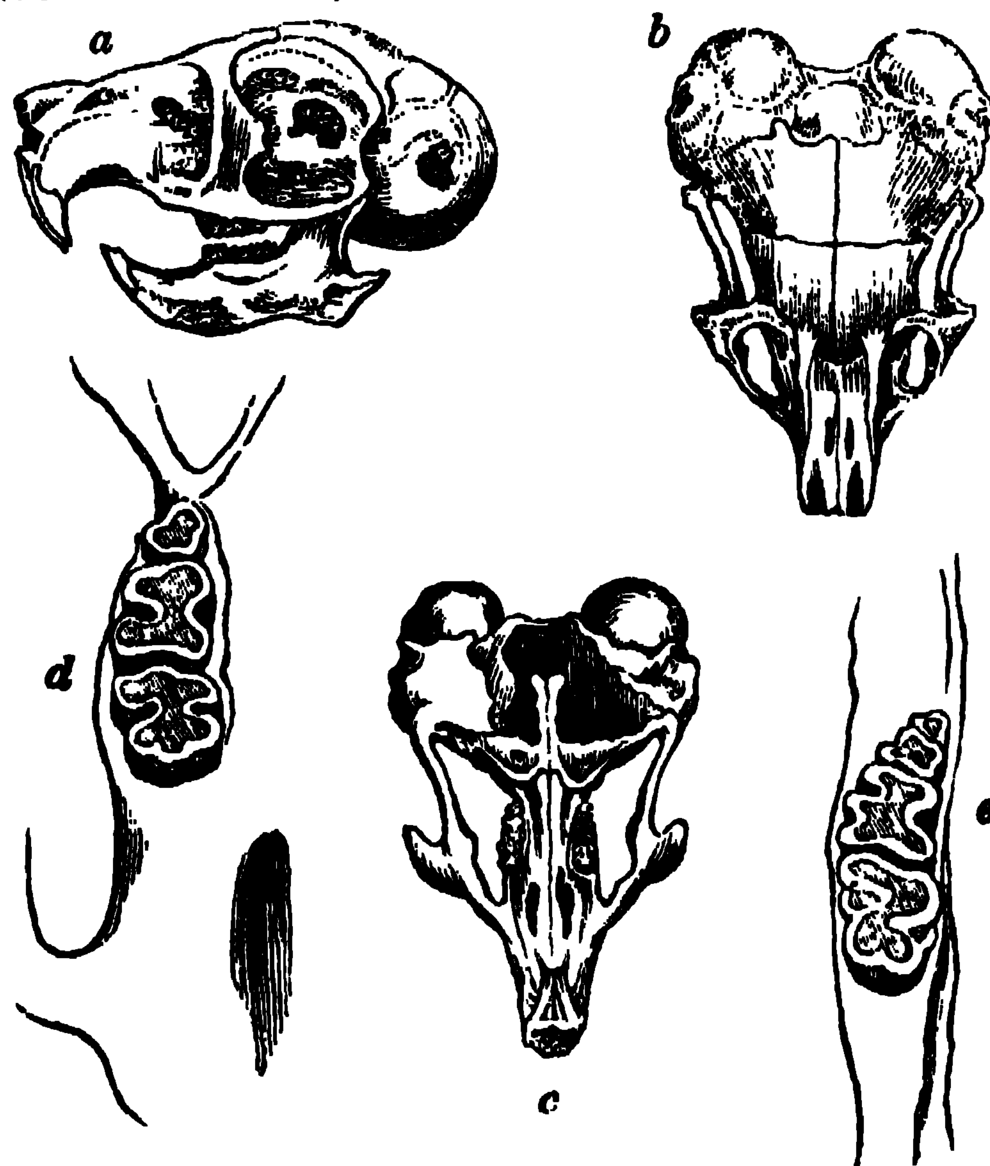
Mr. Swainson says, 'The best-known species is the Gerbo, or Egyptian Jerboa (Dipus Sagitta), in which country it is very common. It lives in large societies and constructs burrows under ground: it is shy and timid, nor can it be kept in confinement any considerable time. Of four typical species already known, three inhabit the sandy deserts in the heart of Asia, and the shores of the Caspian; the rest have been separated as a subgenus, under the name of Gerbil (*Gerbillus*); but their distinctions are so very slight that we have not adopted the name. The genus *Pedetes*, represented by the Cape Jerboa, clearly belongs to the same group. America, which has no Jerboas, nevertheless presents us with their prototypes in the Jumping Mice of Canada (*Meriones*, Illig.).'

The Jerboas have, in truth, presented considerable diffi-

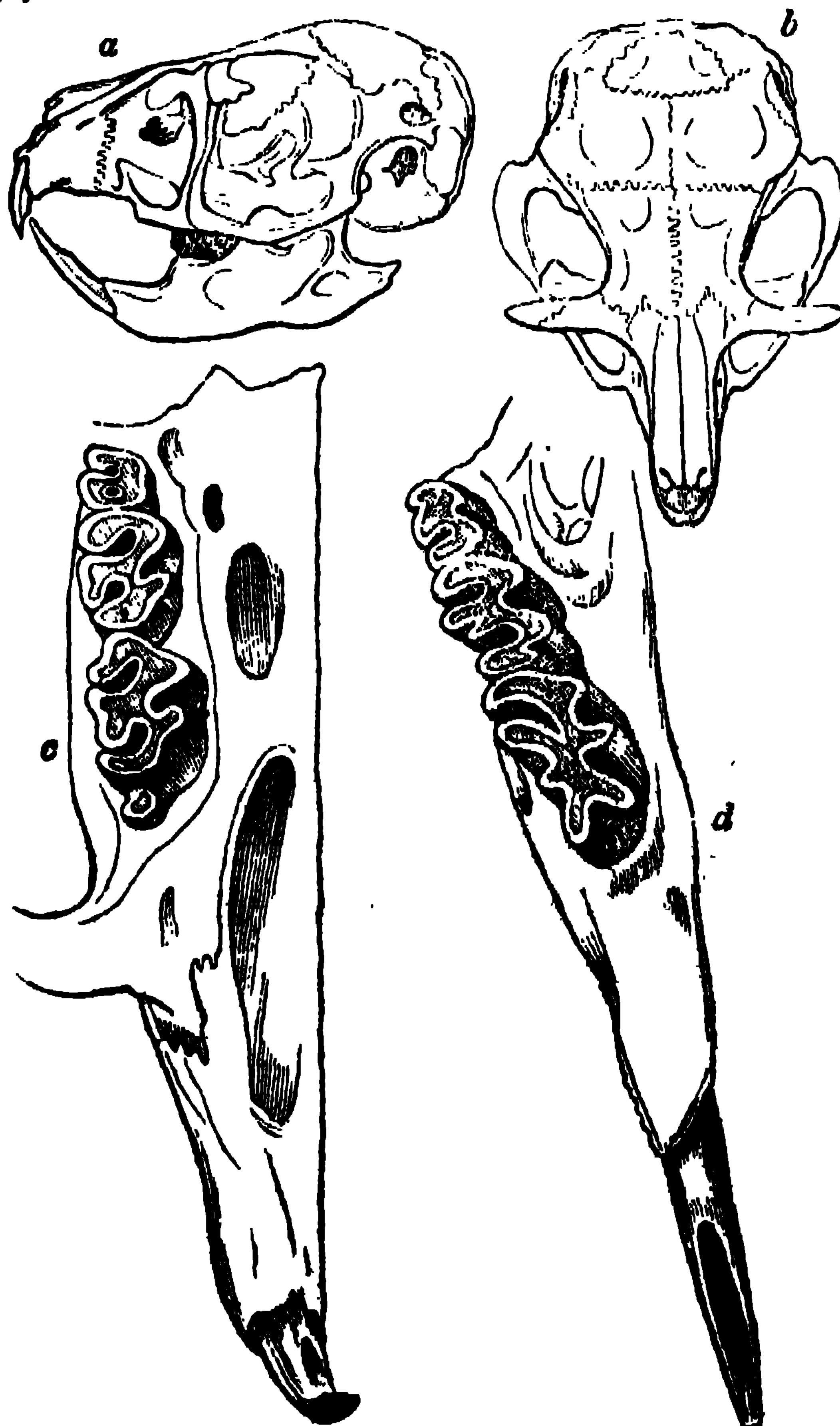
culties to zoologists, and the distinction of the species is often not clearly made out. Sonnini was one of the first who endeavoured to dissipate the confusion which prevailed on the subject. He comes to the conclusion that there exists but one variety of them in Egypt, where they are multiplied without end. 'In fact,' says M. Sonnini, 'among all those which I have observed at different times and in different places, I never remarked the least dissimilitude of either form or colour.' His paper, M. Berthout van Berchem's letter on the true nomenclature of the Gerboise, and M. Sonnini's reply to the same, will be found in the 'Travels' of the latter in Upper and Lower Egypt. That these Jerboas were known to the antients is evident. Herodotus (iv. 192) alludes to them as inhabiting Africa. Aristotle (*Hist. Anim.*, vi. 37) speaks of them as those Egyptian Rats which walk on two feet, because the hind feet are great and the fore feet small. They are noticed by Ælian (xv. 26), who quotes Theophrastus. The description of Theophrastus (Fr. xiv.) cannot be mistaken. He says that these rats have indeed fore feet, but do not walk upon them and use them as hands. When they flee, he adds, they leap. They are clearly the *Ægyptii mures* of Pliny, who says '*bipedes* ambulant' (x. 65), and Pennant gives an engraving of a gold coin with the plant *Silphium* and one of these animals represented on it, and says that these symbols were used to denote the country of Cyrene, where both were found.

One of the best monographs of the genus *Dipus* is that of M. Lichtenstein: the species he gives are numerous, and it may be doubted whether some of them are not varieties. A very elaborate memoir on the Jerboas and Gerbillas, by M. F. Cuvier, was read before the Zoological Society of London in 1836, and is published, with beautiful illustrations, in the 'Transactions' of that Society (vol. ii.).

M. F. Cuvier commences this memoir with observing that his attention had been particularly directed to the *Rodentia*, with a view of arriving at a natural classification of the numerous species composing that order, among which considerable confusion had hitherto prevailed, particularly in the genera *Dipus* and *Gerbillus*, the relations of which to other allied groups had been but very imperfectly understood by previous writers. The species included in the genus *Dipus* had been formed by M. Lichtenstein into three divisions, which are distinguished by the absence and number of rudimentary toes upon the hind feet. In the first section are placed those with three toes, all perfectly formed; in the second, those with four, one of which is rudimentary; and in the third, those with five, two of these being rudimentary. M. Cuvier states that he is unacquainted with the second division of M. Lichtenstein; but in the examination of the species belonging to the first, in addition to the absence of rudimentary toes, he finds that they are also distinguished from those of the third by the form of the teeth and the osteological characters of the head. These points of difference he considers of sufficient importance to justify a distinct genus for the Jerboas with five toes, adopting the name *Alactaga*, given by Pallas to a species, as the common generic appellation. M. Cuvier remarks that the three principal toes of the *Alactagas*, as well as the three only toes of the Jerboas, are articulated to a single metatarsal bone, and that the two rudimentary toes of the first genus have each their metatarsal bone; whence it results that the penultimate segment of the foot is composed of three bones in the *Alactagas*, and of one only in the *Jerboas*. The incisors of the *Alactagas* are simple, whilst those in the upper jaw of the Jerboas are divided longitudinally by a furrow. The molars of the latter genus are complicated in form, and but little resemble those of the former They are four in number in the upper jaw, and three in the lower; but the first in the upper is a small rudimentary tooth, which probably disappears in aged individuals. After a detailed account of the structure of the grinding teeth, M. Cuvier observes that the general structure of the head of the *Alactagas* and *Jerboas* is evidently the same, and is characterised by the large size of the cranium, the shortness of the muzzle, and, above all, by the magnitude of the suborbital foramina. The cranium of the *Jerboa* is distinguished by its great breadth posteriorly, resulting from the enormous development of the tympanic bone, which extends beyond the occipital posteriorly and laterally, as far as the zygomatic arch, which is by no means the case in the *Alactagas*, where all the osseous parts of the ear are of moderate dimensions. Another differential character between the two genera is presented by the maxillary arch, which circumscribes externally the suborbital foramina, and which, in the *Alactagas*, may be said to be linear, presenting a very limited surface for the attachment of muscles. He then notes a difference in the relative development of the jaws, the lower being comparatively much shorter in the *Alactagas* than in the *Jerboas*. Having described a new species of *Alactaga*, a native of Barbary, under the name of *Alactaga arundinis*, M. F. Cuvier proceeds to consider the characters and affinities of the genera *Gerbillus* and *Meriones*, and enters into a critical examination

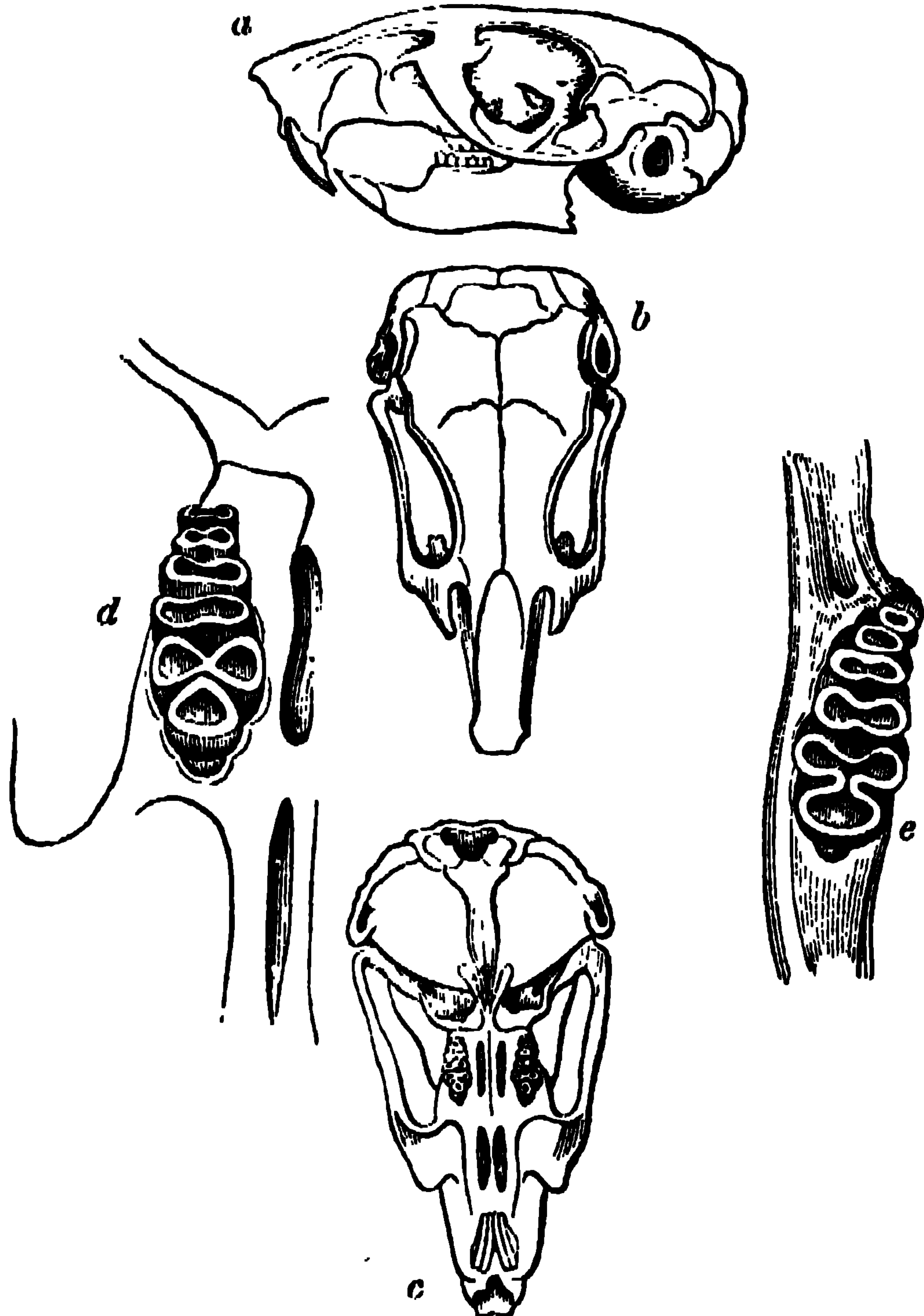


Skull and teeth of Dipus hirtipes. (F. Cuv.)
a, skull, profile; b, same, seen from above; c, same, seen from below; d, e, teeth of same.



Skull and teeth of Alactaga.
a, b, cranium, one-third larger than natural size; c, d, teeth of the same, five times larger than nature.

of all the species referred to that group. To these he adds another species, the habits of which he describes, and to which he gives the name of *Gerbillus Burtoni*. The species he includes are:—1. *Gerbillus Ægyptiacus*. Syn. *Dipus Gerbillus, Meriones quadrimaculatus*, Ehrenberg. 2. *Gerbillus pyramidum*. Syn. *Dipus pyramidum*, Geoff.; *Meriones robustus*, Rüpp. 3. *Gerbillus pygargus*. Syn. *Meriones Gerbillus*, Rüpp. 4. *Gerbillus Indicus*. Syn. *Dipus Indicus*, Hardwicke. 5. *Gerbillus Africanus*. Syn. *Meriones Schlegelii*, Smutz; *G. Afra*, Gray. 6. *Gerbillus brevicaudatus*. 7. *Gerbillus Otaria*. 8. *Gerbillus Burtoni*. For the detailed descriptions of these, we must refer the reader to the 'Transactions of the Zoological Society,' in which will also be found M. F. Cuvier's views with regard to the affinities of the *Gerbillas* and *Alactagus* to the *Jerboas*, and which lead him to the conclusion that the Gerbillas have a much nearer affinity to the *Muridæ*.



Cranium and teeth of Gerbillus Burtoni.

a, skull, profile; *b*, same, seen from above; *c*, same, seen from below; *d, e*, teeth of same.

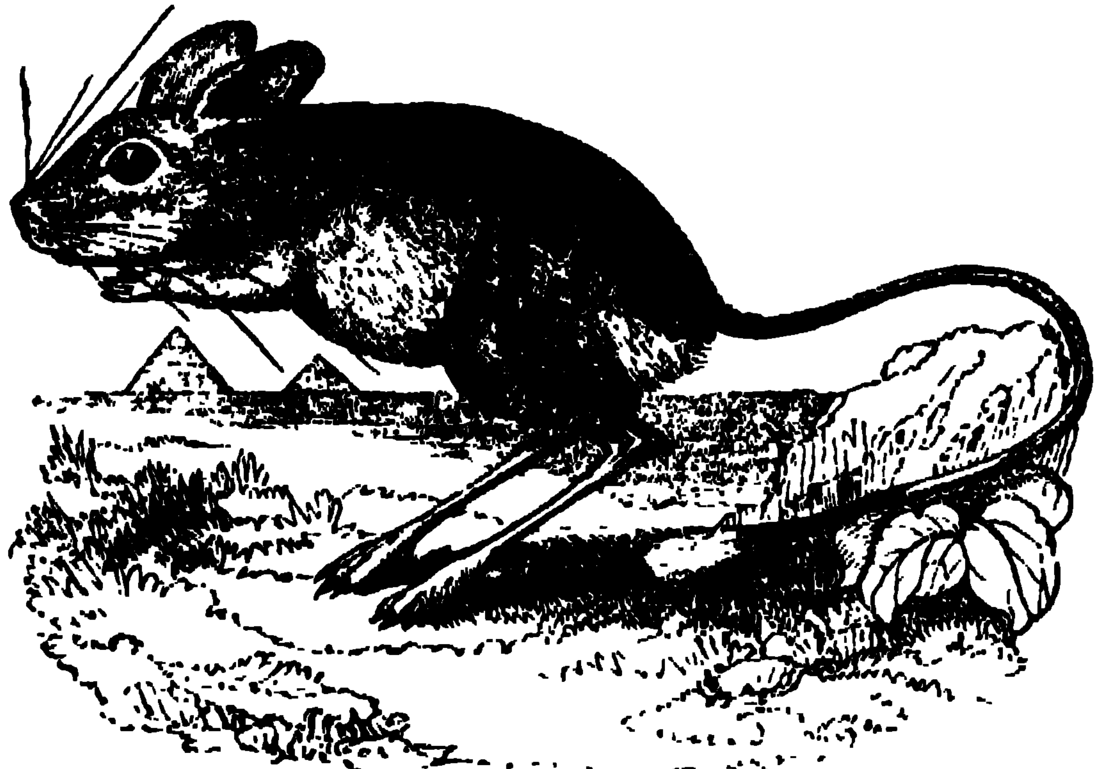


Gerbillus Burtoni.

Habits, &c.—General Hardwicke gives the following interesting account of his *Dipus Indicus*:—'These animals are very numerous about cultivated lands, and particularly



Dark-banded Jerboa.



Egyptian Jerboa (Dipus Ægyptius, *Hempr.* and *Ehren.*)

destructive to wheat and barley crops, of which they lay up considerable hoards in spacious burrows near the scenes of their plunder. They cut the culms of the ripening corn just beneath the ears, and convey them thus entire to one common subterraneous repository, which, when filled, they carefully close, and do not open for use till supplies abroad become distant and scarce. Grain of all kinds is the favourite food; but, in default of this, they have recourse to the roots of grass and other vegetables. About the close of day they issue from their burrows, and traverse the plains in all directions to a considerable distance; they run fast, but oftener leap, making bounds of four or five yards at a time, carrying the tail extended in a horizontal direction. When eating, they sit on their hind legs like a squirrel, holding the food between their fore feet. They never appear by day, neither do they commit depredations within doors. I have observed their manners by night, in moonlight nights, taking my station on a plain, and remaining for some time with as little motion as possible. I was soon surrounded by hundreds at the distance of a few yards; but on rising from my seat, the whole disappeared in an instant, nor did they venture forth again for ten minutes after, and then with much caution and circumspection.

'A tribe of low Hindus, called Kunjers, whose occupation is hunting, go in quest of these animals at proper seasons, to plunder their hoards of grain; and often, within the space of twenty yards square, find as much corn in the ear as could be crammed into a common bushel. They inhabit dry situations, and are often found at the distance of some miles out of the reach of water to drink. In confinement this animal soon becomes reconciled to its situation, and docile; sleeps much in the day, but when awake feeds as freely as by night. The Hindus above mentioned esteem them good and nutritious food.' (*Linn. Trans.*, vol. viii.)

In concluding this sketch, which we hope will be found to contain the leading information on the subject of the *Jerboïdæ*, we must not omit to mention Mr. Ogilby's notice of the discovery of a true Jerboa on the central downs of

Australia, by Sir Thomas Mitchell, an event, as Mr. Ogilby justly says, of no small interest to the scientific zoologist who occupies himself with the important question of the geographical distribution of animals. 'The arid deserts of Asia and Africa, the solitary steppes of Southern Siberia, and the boundless prairies of America, have been long known to be inhabited by numerous species belonging to this or the closely allied genus of *Gerbilles;* in short, wherever extensive and open plains were found to exist, whether in the Old World or in the New, there likewise were found these little two-legged rats, hopping along or running with great velocity upon their hind legs, and appearing as if nature had expressly intended them to occupy such a situation. Australia alone was believed to form an exception to the general rule in this instance, as in so many others. Who will undertake to say that the progress of discovery may not destroy its anomalous character in many other instances, as it has done in this?' (*Linn. Trans.*, vol. xviii.) Mr. Ogilby then proceeds to name this species *Dipus Mitchellii*, after its meritorious discoverer, and gives a detailed description of the species, for which we refer to the vol. of the 'Linnean Transactions' last above quoted. The animal was found on the reedy plains near the junction of the Murray and the Murrumbidgee, on the northern boundaries of Australia Felix. The cut is taken from the figure in Sir T. Mitchell's account of 'Three Expeditions into the Interior of Eastern Australia.' Sir T. Mitchell states that its fore and hind legs resembled in proportion those of the Kangaroo; and it used the latter by leaping on its hind quarters in the same manner. It was not much larger than a common field-mouse, but the tail was longer in proportion even than that of a Kangaroo, and terminated in a hairy brush about two inches long.



Dipus Mitchellii.

Here we may perhaps notice that Mr. Ogilby, in the same paper as that wherein he describes *D. Mitchellii*, characterises another new genus of Australian Rodents, which he thinks most probably belongs to the extensive and complicated family of the *Muridæ*. In some of the characters the genus very much resembles the Campagnols (*Arvicola*) and Gerbilles (*Meriones*), to the latter of which genera Mr. Ogilby says that *Conilurus* is more particularly related by the length and development of the posterior members.

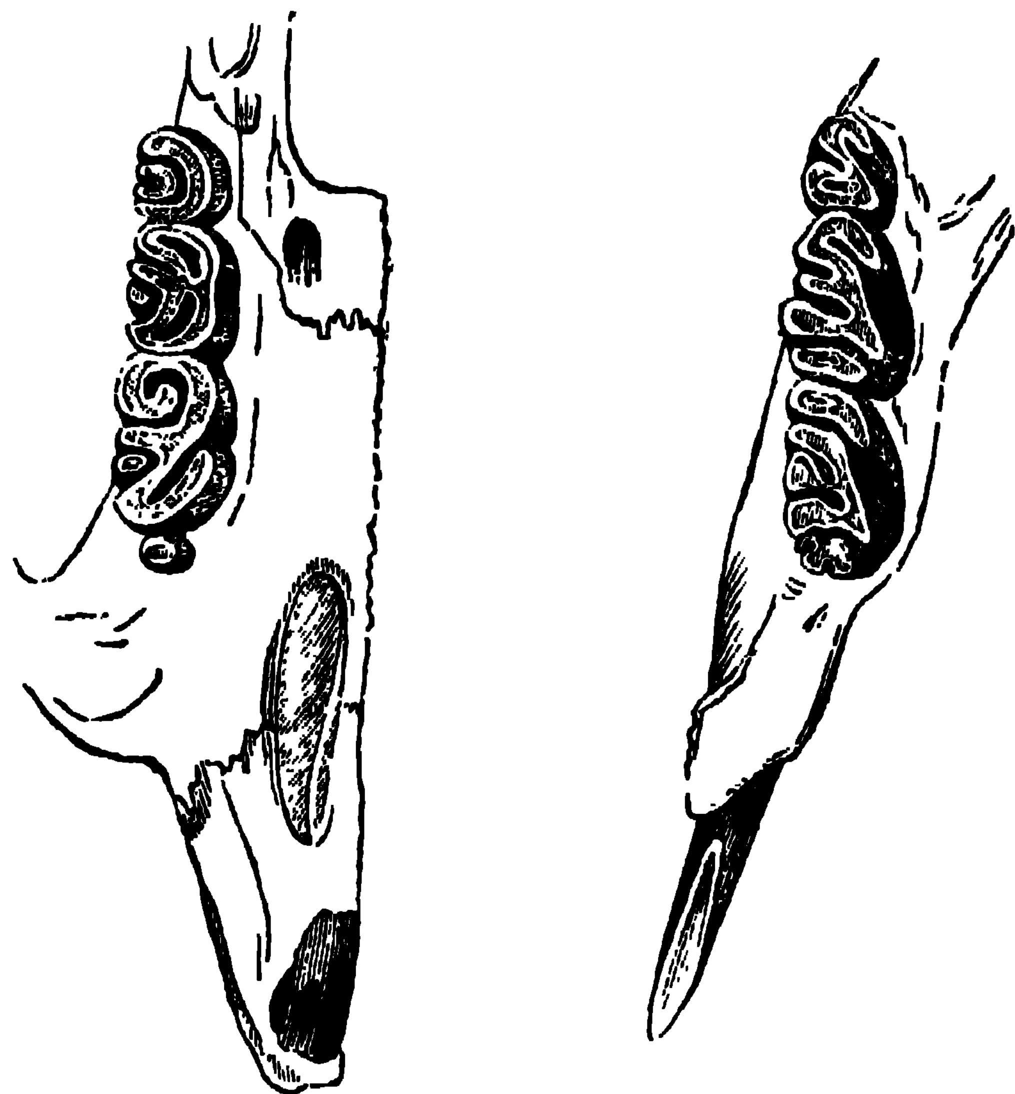
Meriones. (Ill., F. Cuv.)

Generic Character.—Differing from the other Rats with long feet in the form of its molars, which are composite.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{3-3} = 18$.

Example, *Meriones Labradorius; Labrador Jumping Mouse.*

Description.—Back and upper parts of the head dark



Teeth of Meriones. (F. Cuv.)

liver-brown mixed with brownish-yellow; sides brownish-yellow slightly sprinkled with black; margin of the mouth, chin, throat, and all the lower parts of the body white; yellowish-brown of the sides joining the white of the belly by a straight line extending between the fore and hind extremities. Fur not so long or so fine as that of the common or meadow mice. Total length nine inches nine lines, of which the tail measures five inches three lines; this last tapers slightly, is scaly, and thinly set with short hairs.

Dr. Richardson, from whose *Fauna Boreali-Americana* the above description is abridged, states that in some specimens the yellowish-brown colour occupies as much space as the darker colour of the back; in others the latter encroaches so much on the sides as to leave merely a narrow yellowish line next the white; whilst in autumn specimens, where the animal has just acquired a new coat of fur, the dark colour of the back adjoins the white of the belly.

This appears to be the *Labrador Rat* of Pennant; *Gerbillus Hudsonius* of Rafinesque-Smaltz; *Mus Labradorius* of Sabine; *Gerbillus Labradorius* of Harlan; *Labrador Jumping Mouse* of Godman; and *Katse* (the leaper) of the Chepewyan Indians.

Dr. Richardson remarks that Pennant, in his 'Arctic Zoology,' first described a specimen of this animal, sent from Hudson's Bay by Mr. Graham, to the museum of the Royal Society. Afterwards, in the third edition of his 'History of Quadrupeds,' he is inclined to consider it as identical with the *mus longipes* of Pallas (the *Dipus meridianus* of Gmelin), an inhabitant of the warm sandy deserts bordering on the Caspian Sea. This opinion, which, in the opinion of the Doctor, can scarcely be correct, was, he says, formed from an imperfect inspection of the Hudson's Bay specimen whilst it was suspended in spirits, and is opposed by differences in colour and other characters which he himself points out. From Pennant's time until Mr. Sabine described an individual brought from Cumberland House, on Captain Franklin's first journey, the *Labrador Jumping Mouse* does not, continues Dr. Richardson, appear to have attracted the notice of naturalists. Pennant, he observes, mentions a yellow lateral line in his specimen, which did not exist in the one Mr. Sabine described, but this difference Dr. Richardson attributes solely to the season in which they were procured. Mr. Sabine's specimen, he remarks, was mutilated in the tail, an accident very common to the whole family of rats; and Pennant, under the name of *Canada Jerboid Rat*, and Colonel Davies, under that of *Dipus Canadensis*, describes another Jumping Mouse, which seems to differ from this in having ears shorter than the fur, but in other respects to be very similar to it.

After further observing that the *Gerbillus Canadensis* of Dr. Godman agrees in description with Rafinesque-Smaltz's *Gerbillus soricinus* (Desm.), but has larger ears than the Canada Rat of Pennant, and that a specimen in the Philadelphia museum, described by Dr. Harlan under the name of *Gerbillus Canadensis*, appears to be entirely similar to the Labrador species, Dr. Richardson concludes

by remarking that it is evident that the Jumping Mice inhabiting different districts of America require to be compared with each other before the true number of species and their geographical distribution can be ascertained.

Locality.—Common in the Fur Countries as far north as Great Slave Lake, and perhaps farther; but Dr. Richardson was not able to gain any precise information respecting its habits.



Labrador Jumping Mouse.

Pedetes (Ill.; *Helamys*, F. Cuv.)

Generic Character.—Head large, flattish, muzzle thick, ears long. Anterior extremities with five toes armed with very long claws; posterior extremities very long, four-toed. Tail long and very bushy. Four pectoral mammæ. Molars simple, with two laminæ.

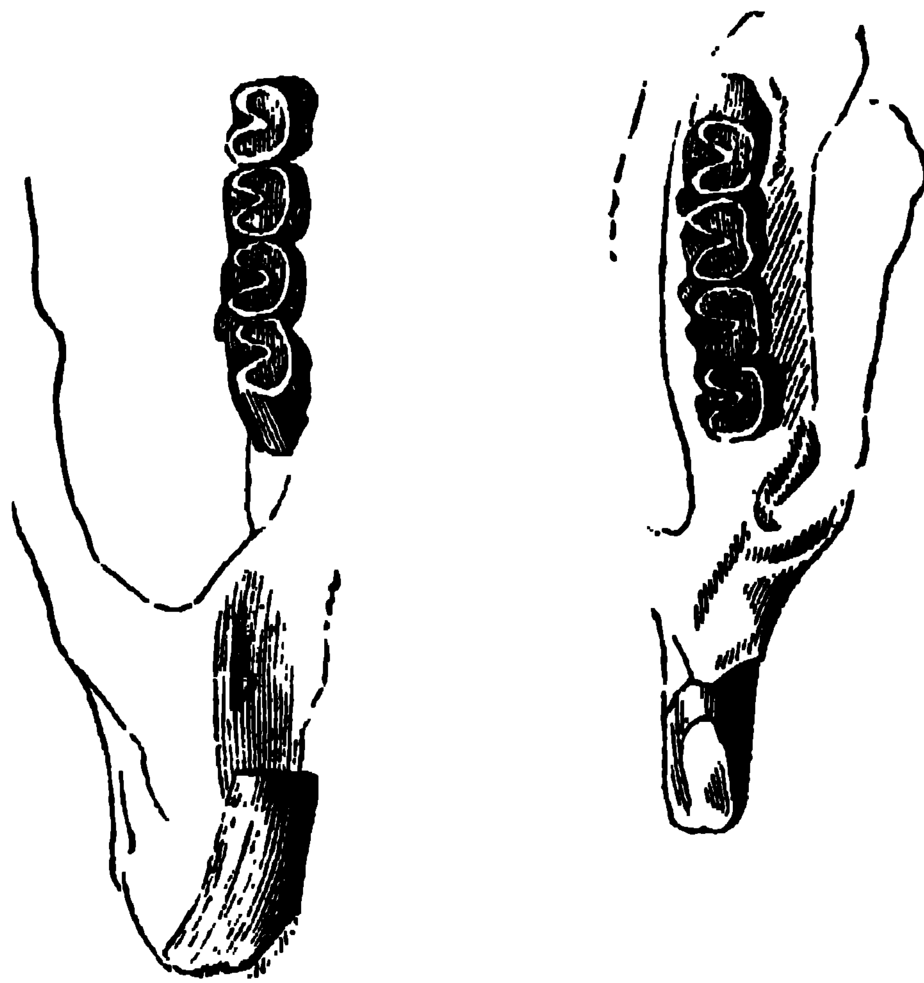
Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4} = 20$.

Example, *Pedetes Capensis.*

Description.—Bright yellowish-tawny above, varied with blackish; white below, with a line of the same colour in the fold of the groins; legs brown, tail reddish above at its origin, grey below, and black at the tip. Length from nose to tail about one foot two inches; of the tail, near fifteen; of the ears, three.



Pedetes Capensis.



Teeth of Helamys.

This is the *Grand Gerbo* of Allamand, *Spring-Has* or *Jumping Hare* of the Dutch, *Aerdmannetje* of the Hottentots, *Dipus Caffer* of Zimmerman, Schreber, and Gmelin.

Locality, Habits, &c.—Cape of Good Hope, where it sleeps during the day, going forth by night, and leaping twenty or thirty feet at a bound. It eats sitting nearly upright, with the hind legs extended horizontally, and using the small fore-feet to bring the food to its mouth. It is a very strong animal, and with these same fore-feet, which are admirably formed for digging, burrows so expeditiously as quickly to hide itself. It sleeps in a sitting position, placing the head between the legs, and holding its ears over its eyes with its fore-legs.

Tail moderate or short. Sand and Mole Rats. Pouched.

The genera *Saccophorus*, Kuhl; *Pseudostoma*, Say; *Geomys* and *Diplostoma* of Rafinesque; *Ascomys* of Lichtenstein; and *Saccomys* of F. Cuvier, are given by Dr. Fischer as synonymous; and indeed the distinctions, except perhaps in the case of *Geomys* and *Diplostoma*, do not appear to be sufficiently marked to warrant their separation.

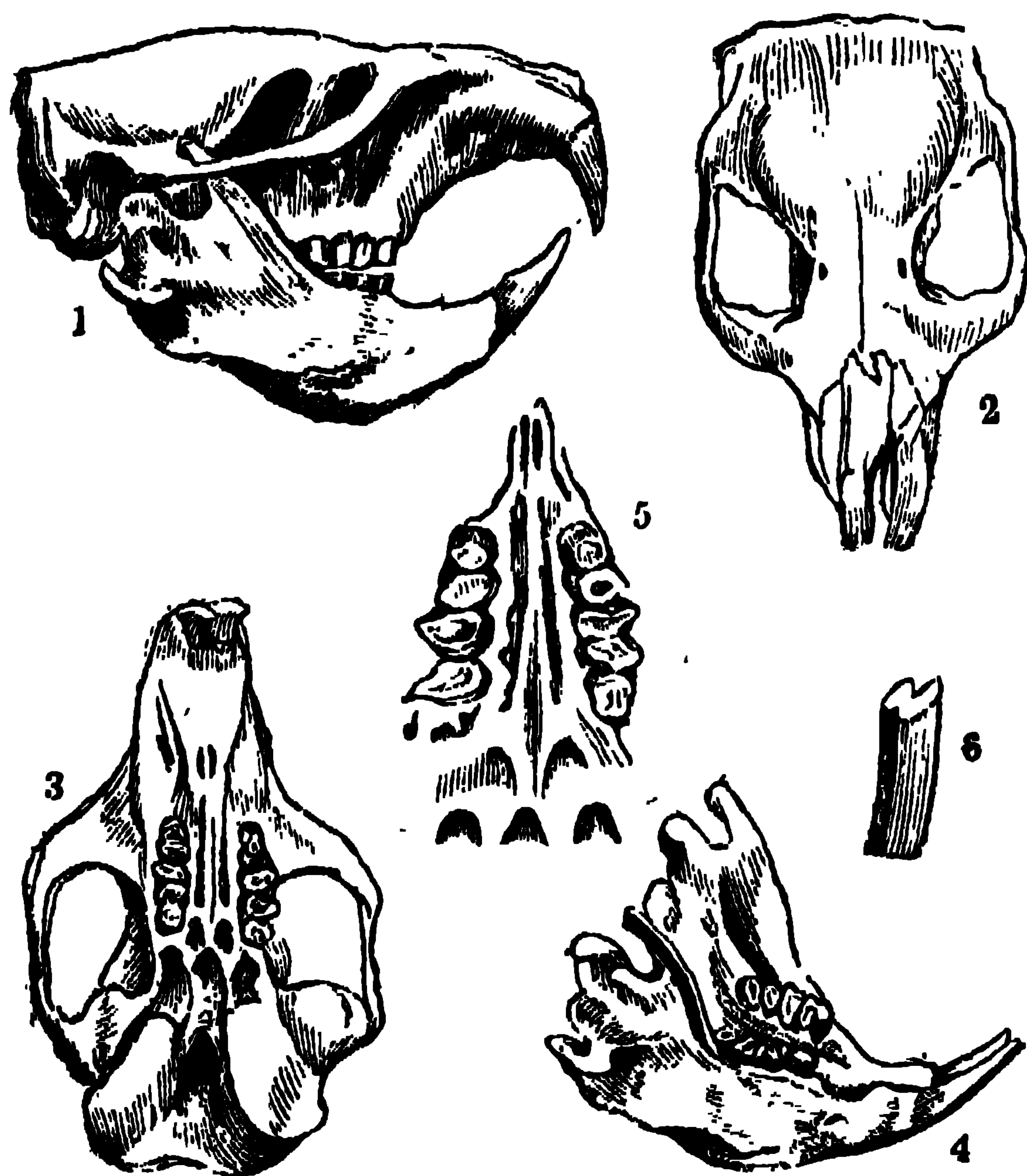
Dr. Richardson remarks that M. Rafinesque-Smaltz, in 1817, founded his genus *Geomys* on the hamster of Georgia (*Geomys pinetis*), described by Mitchell, Anderson, Meares, and others, and referred to it, as a second species, the *Canada pouched Rat* (*Mus bursarius* of Shaw). Under another genus, *Diplostoma*, he arranged some Louisiana or Missouri animals, known to the Canadian voyagers by the appellation of *gauffres*, and remarkable for their large cheek-pouches, which open forwards exterior to the mouth and incisors, to which they form a kind of hood. These two genera, observes the Doctor, have been adopted by few naturalists; and the American systematic writers have either overlooked M. Rafinesque's species entirely, or referred them all to *Mus bursarius*. In the latter case, Dr. Richardson says, they are undoubtedly wrong, for there are at least six or seven distinct species belonging to one or other of these genera, which inhabit America, and he thinks that both *Geomys* and *Diplostoma* will eventually prove to be good genera: the *Sand-rats* belonging to the former having cheek-pouches, which are filled from within the mouth, and the *gauffres* or *camas-rats* of the latter genus having their cheek-pouches exterior to the mouth, and entirely unconnected with its cavity. Dr. Richardson had no opportunity of examining *Geomys pinetis*, the type of the genus, but he had inspected an undescribed species from Cadadaguios and another (*Geomys Douglasii*) from the banks of the Columbia; from these two Dr. Richardson's characters of the genus were drawn up. With regard to the *Canada pouched Rat*, great doubt, he observes, still exists as to whether it belongs properly to *Geomys* or to *Diplostoma*. Judging from the description of Dr. Shaw and the figure in 'Linn. Trans.' (vol. v., pl. 8), Dr. Richardson has little doubt of the cheek-pouches opening into the mouth, and of their being precisely similar in form and functions to the cheek-pouches of the *Sand-rats*; but he states that he was told, on good authority, that the identical specimen described by Shaw (which, at the sale of Bullock's museum,

passed into the hands of M. Temminck) is, in fact, similar to the *gauffres*, in having cheek-pouches that open exteriorly, and that consequently Major Davies's drawing represented them in an unnatural and inverted position. Mr. Say gives the characters of a Missouri *gauffre*, with cheek-pouches opening exteriorly; and he identifies his specimen with *Mus bursarius*. The same zoologist alludes to the Georgia hamster as belonging to the same genus, without giving any further account of its characters than merely quoting Dr. Barton's remark of its being only half the size of the Missouri one. His account of the dentition of the Missouri *gauffre*, observes Dr. Richardson in conclusion, corresponds, as far as it goes, pretty closely with that of the Columbia *Geomys*. Dr. Harlan and Dr. Godman refer the Georgia, Canada, and Missouri animals to one species. (*Fauna Boreali-Americana*.)

The following is the dental formula of Geomys given by Dr. Richardson:—

Incisors, $\frac{2}{2}$; canines, $\frac{0-0}{0-0}$; grinders, $\frac{4-4}{4-4} = 20$,

and below is given the skull and teeth of the genus from the same authority.

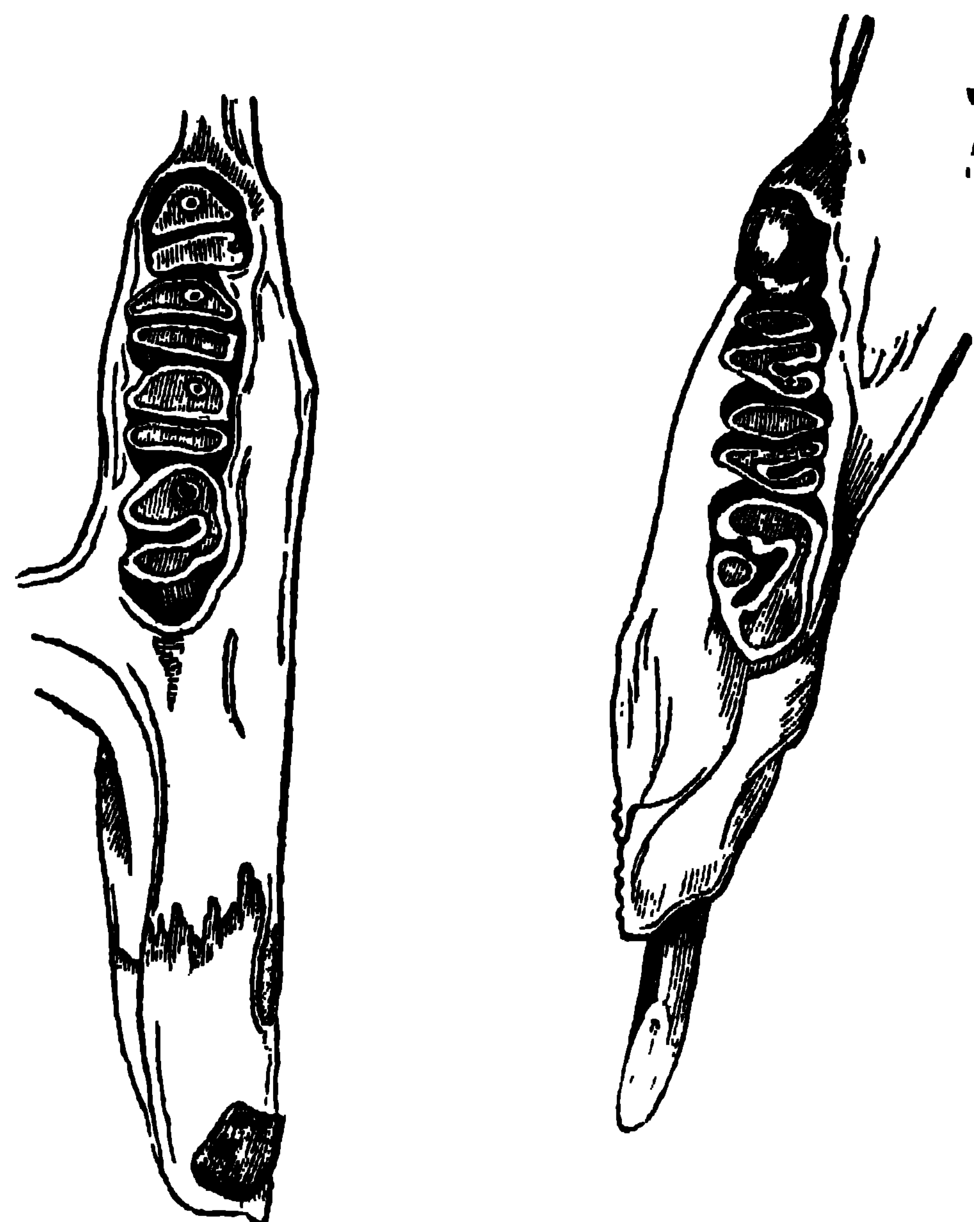


Skull and teeth of Geomys. (Richardson.)

1, 2, 3, skull, nat. size; 4, lower jaw, nat. size; 5, palate and upper teeth, magnified; 6, first upper grinder, magnified.

The dental formula of M. F. Cuvier's genus *Saccomys* is:—

Incisors, $\frac{2}{2}$; molars, $\frac{4-4}{4-4} = 20$, and the following cut is taken from his figure of the dentition.

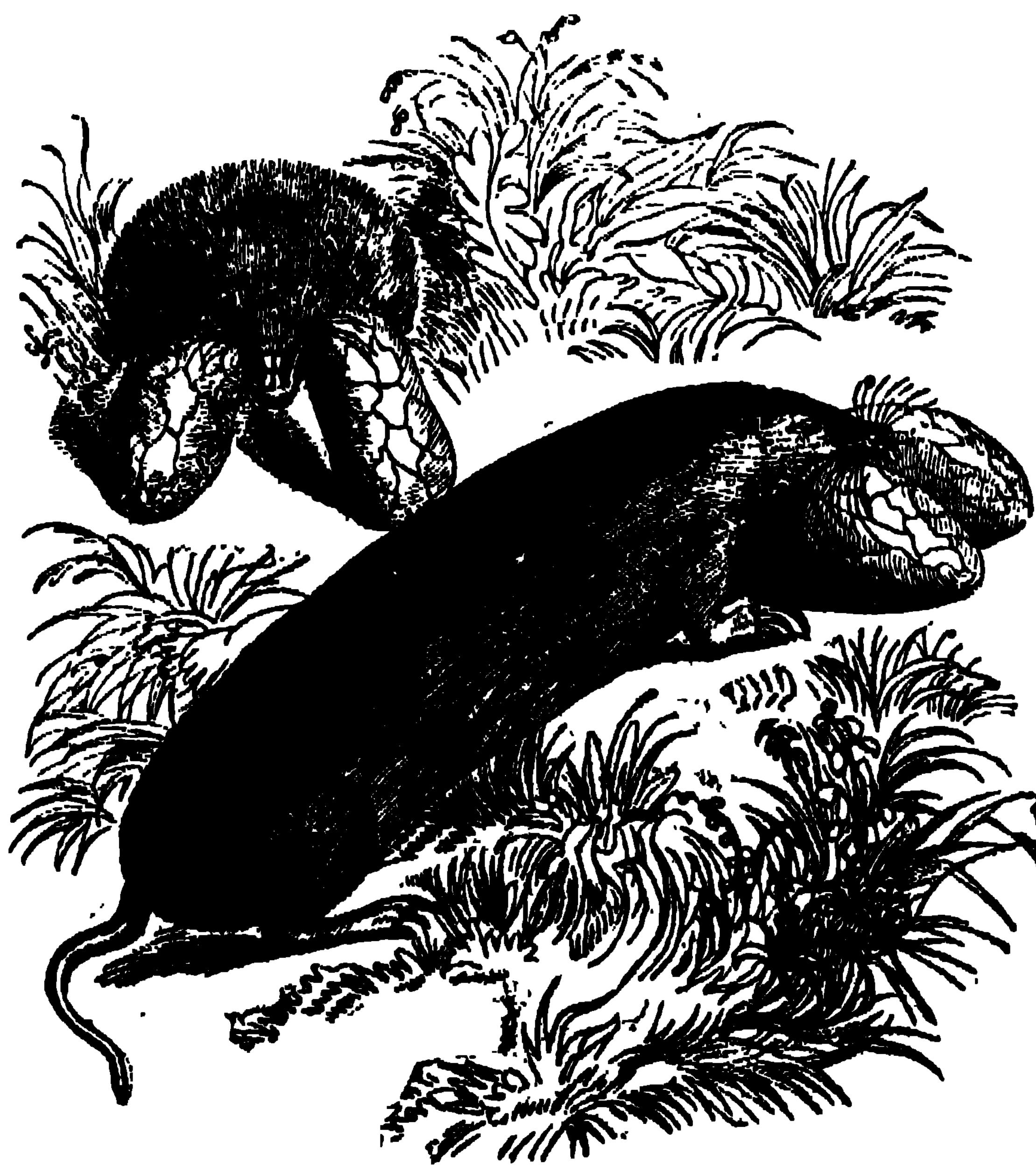

Teeth of Saccomys, enlarged. (F. Cuv.)

The following is Dr. Shaw's description of *Mus bursarius*:—

'Ash-coloured rat, with short nearly naked tail, pouched cheeks, and the claws of the fore-feet very large and formed for burrowing.'

(Mus bursarius, *Linn. Trans.*, vol. v., p. 227, pl. 8.)

'This, which is a species but lately discovered, seems to be the most remarkable of all the pouched rats for the proportional size of the receptacles. It is a native of Canada, and the individual here figured was taken by some Indians in the year 1798, and afterwards presented to the lady of Governor Prescot. It is about the size of a brown or Norway rat, and is of a pale greyish-brown colour, rather lighter beneath: the length to the tail is about nine inches, and that of the tail, which is but slightly covered with hairs, about two inches: the legs are short; the fore-feet strong, and well adapted for burrowing in the ground, having five claws, of which the three middle ones are very large and long; the interior much smaller, and the exterior very small, with a large tubercle or elbow beneath it. The claws on the hind-feet are comparatively very small, but the two middle are larger than the rest, and the interior one is scarce visible: the teeth are extremely strong, particularly the lower pair, which are much longer than the upper; the ears are very small. This species is described in the 5th vol. of the *Trans. of Linn. Soc.*, but I must observe, that, by some oversight in the conduct of the figure there given, the claws on the fore-feet are represented as only three in number, and are somewhat too long, weak, and curved; the engraving in the present plate is a more faithful representation, and is accompanied by an outline of the head, in its natural size, as viewed in front, in order to show the teeth and cheek-pouches. The manners of this species are at present unknown, but it may be concluded that it lays in a stock of provisions, either for autumnal or winter food. The pouches of the individual specimen above described, when first brought to Governor Prescot, were filled with a kind of earthy substance: it is therefore not improbable that the Indians who caught the animal might have stuffed them thus, in order to preserve them in their utmost extent.'

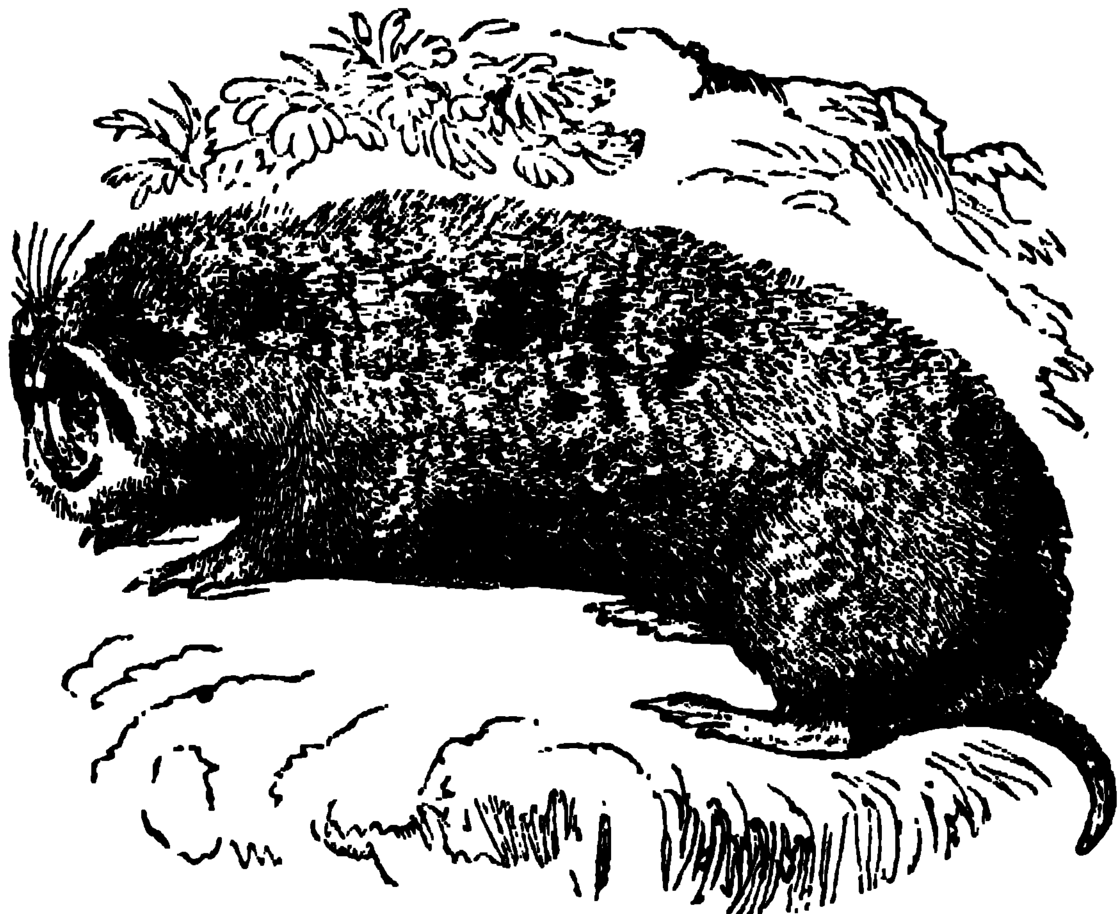

Mus bursarius.

In Dr. Richardson's *Geomys Douglasii*, the length of the head and body was 6 inches 6 lines; and that of the tail (vertebræ) 2 inches 10 lines. Cheek-pouches large, much resembling the thumb of a lady's glove in form and

size, and hanging down by the sides of the head. The specimen was a female, and was taken in her nest with three young ones, near the mouth of the Columbia, by Mr. Douglas. When it came into the hands of Dr. Richardson, the fur had mostly fallen off, but the specimen was in other respects perfect, and what was wanting to the description was supplied from Douglas's notes. The state of ossification of the skull showed the animal to be an old one. Douglas informed Dr. Richardson that the outside of the pouches was cold to the touch, even when the animal was alive, and that on the inside they were lined with small, orbicular, indurated glands, more numerous near the opening into the mouth. When full, the pouches had an oblong form, and when empty, they were corrugated or retracted to one-third of their length; but, it is added, they are never inverted so as to produce the hood-like form of the pouch of a *Diplostoma.* When in the act of emptying its pouches, the animal sits on its hams like a Marmot or squirrel, and squeezes his sacks against the breast with his chin and fore-paws. (*Fauna Boreali-Americana.*)

Habits, &c.—Dr. Richardson states that these little sand-rats are numerous in the neighbourhood of Fort Vancouver, where they inhabit the declivities of low hills, and burrow in the sandy soil. They feed on acorns, nuts (*corylus rostrata*), and grass, and commit great havoc in the potato-fields adjoining the Fort, not only by devouring the potatoes on the spot, but by carrying off large quantities of them in their pouches.

The following figure is copied from Dr. Richardson's *Diplostoma? bulbivorum.*



Diplostoma bulbivorum.

Not Pouched.

Aplodontia. (Richardson.)

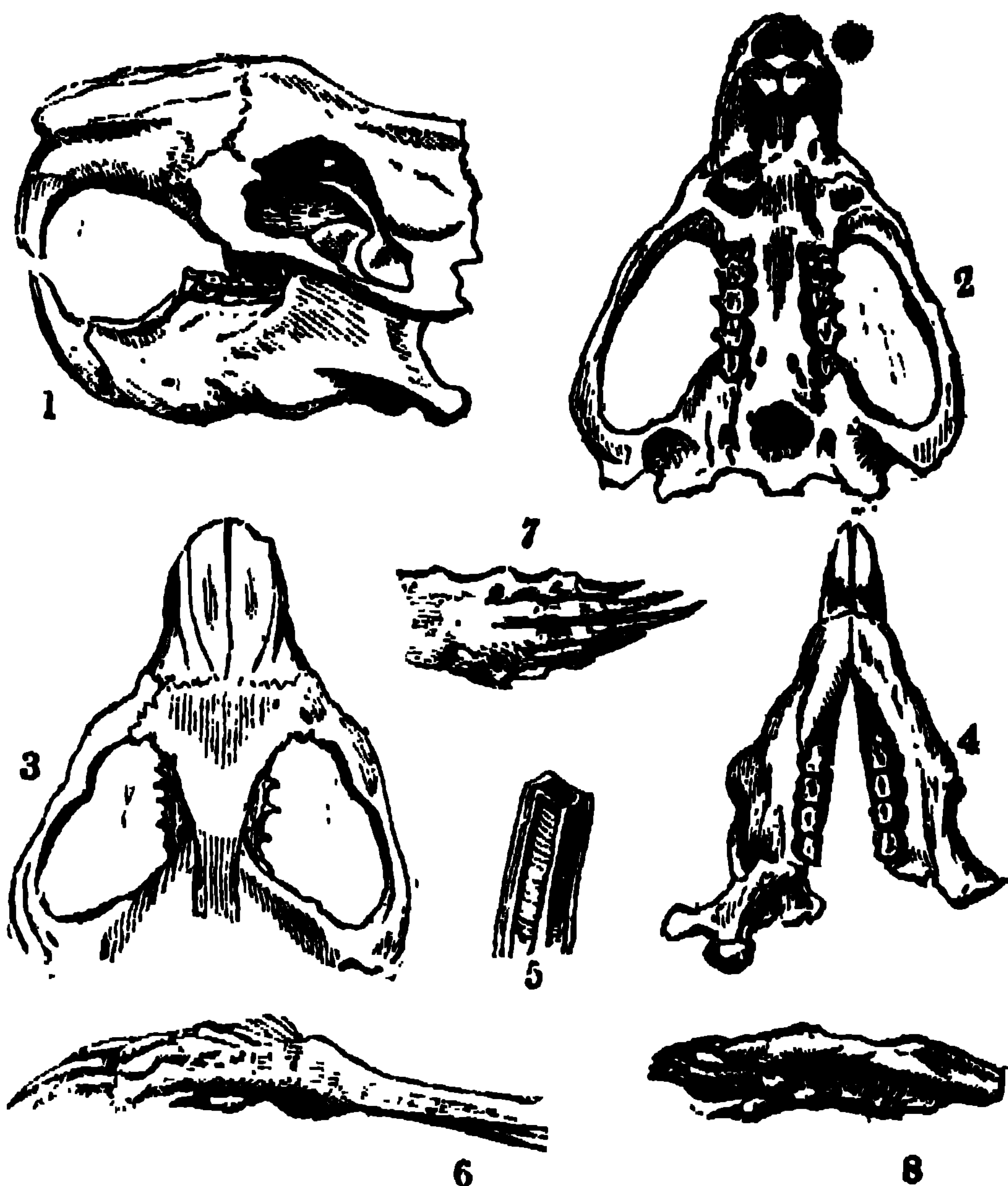
Generic Character.—Head large, depressed; ears short and round; no cheek pouches. Feet five-toed, with large, strong, and compressed claws. Tail very small and concealed by the fur. First molar in upper jaw small, cylindrical, and pointed, placed within the anterior corner of the second one, and existing in the adult.

Dental Formula:—Incisors, $\frac{2}{2}$; molars, $\frac{5-5}{4-4}$ = 22.

Example, *Aplodontia leporina.*

Description.—Head large; nose thick and obtuse, covered with a dense coat of short fur; eye very small; ear resembling the human in form. Body short, thick, and rabbit-like. Legs very short, and covered down to the wrists and heels with fur similar to that on the body: a little above the wrist joint, on the inner side, is a small tuft of stiff white hairs. Fur like that of a rabbit out of season, amber and chesnut-brown above; greyish or clove-brown beneath; lips whitish; a rather large spot of pure white on the throat; some white hairs dispersed through the fur. Tail slender, cylindrical, hardly half an inch long.

Dr. Richardson gives the following as the synonyms of this animal:—*Sewellel,* Lewis and Clark; *Anisonyx? rufa,* Rafinesque-Smaltz, Desm.; *Arctomys rufa,* Harlan; *Marmot,* No. 17, Hudson's Bay Museum; and he says that amongst Mr. Douglas's specimens there was a young one, with more white hairs interspersed through its fur, and some differences in the form of its skull, which seem to



Skull, teeth, and paws of Aplodontia.

1, anterior half of skull, with lower jaw, profile; 2, anterior half of skull, seen from below; 3, the same seen from above; 4, lower jaw, with right condyle broken, seen from above; 5, upper molar tooth; 6, 7, fore-feet, upper surface; 8, sole of hind-foot.

point it out as a second species, but the specimen was not sufficiently perfect to enable Dr. Richardson to give its characters as a distinct species, though he has little doubt of its being so. The Doctor adds, that since the account of the genus was published in the 'Zoological Journal' (vol. iv.), Mr. Douglas had placed in his hands an Indian blanket or robe formed by sewing the skins of the *Sewellel* together. The robe contained twenty-seven skins, which had been selected when the fur was in prime order. In all of them the long hairs were so numerous as to hide the wool or down at their roots, and their points had a very high lustre. The general colour of the surface of the fur was between chesnut and umber-brown, lighter, and with more lustre on the sides. Some of the skins, which were in the best order, had the long hairs on the back of the head and between the shoulders almost black. Dr. Richardson observes further, that it is probable that there were the skins of two species of *Sewellels* in the robe, and that one of them wants the white mark on the throat. The down of all the skins of the robe had a shining blackish grey colour.

Habits.—These animals live in small societies, in burrows, and feed on vegetable substances.

Locality.—Neighbourhood of the Columbia river, most abundant near the great falls and rapids.

Mr. Gray makes the *Aspalacidæ* the fifth family of the *Glires*, with the following character:—

Cutting teeth two in each jaw, lower chisel or awl shaped, often very much exposed; grinders compound or simple, rarely rootless; ears and eyes often very small, sometimes hid; clavicles strong; limbs proportionate; tail none, or hairy, cylindrical; fur very soft. He thus subdivides it into five subfamilies.

† 1. *Aspalacina.* Orycterus, *F. Cuv.* Bathyergus, *Ill.* Aspalax, *Oliv.* 2. *Lemnina.* (Lemmina?) Arvicola, *Lacép.* Sigmodon, *Say.* Neotoma. *Say.* Lemnus (Lemmus), Lin. †† 3. *Cricetina.* Cricetus, Lacép. 4. *Pseudostomina.* Pseudostoma, *Say.* Diplostoma and Geomys, *Rafin.* 5. *Arctomina.* Arctomys, *Gmel.* Spermophilus, *F. Cuv.*

Dr. Fischer thinks that Cretzchmar's genus *Psammomys* should be placed before *Aspalax.* (See Rüppel, *Zool. Atl.*). *Psammomys obesus,* on which the genus is founded, lives gregariously in the sandy deserts of Alexandria, forming multifarious burrows, and is a nocturnal and root-eating animal, without cheek-pouches.

Aspalax (Oliv. and others; *Spalax,* Güld., Ill., and others.)

Generic Character of Aspalax.—Muzzle obtuse. Eyes rudimentary, and hidden under the skin. Ears null, or mere obsolete margins of the auditory passage. Body thick and cylindrical. Feet short, pentadactyle, with falcular claws, proper for digging. Tail null or very short. Molars simple.

Dental Formula:—Incisors, $\frac{2}{2}$; molars, $\frac{3-3}{3-3}$ = 16.

Example, *Aspalax typhlus.*

Description.—Head broader than the body, no aperture for the rudimentary eyes, which, no bigger than poppy-seeds, are hid beneath the skin; no external ears; end of the nose covered with a thick skin, nostrils very remote, and placed below; limbs very short, toes separated, except a thin membrane at the base, claws short; hair or fur short, thick, and very soft, dusky at the bottom and cinereous grey at the tip, space about the nose and above the mouth white. Length between 7 and 8 inches.

This is supposed by some to be the ἀσπάλαξ of Aristotle (*Hist. Anim.*, i. 9, and iv. 8). It is evident, from both the passages quoted, that he had accurately examined that part of the animal where the eye should be, and the result of his examination clearly agrees with the condition of those parts in the *Aspalax* of the moderns; but it must not be forgotten that those and other passages will equally apply to a second species of Mole (*Talpa*), now named *Talpa cæca*, which inhabits Europe, and in which the eyelids are closed, whilst in the common species they are open. It appears to be the *Spalax typhlus* of Illiger; *Aspalax typhlus* of Desmarest; *Mus typhlus* of Pallas and others; *Marmota typhlus* of Blumenbach; *Georychus typhlus* of Lesson; the *Zemni* of Rzaczynski; the *Slepez* of Gmelin; the *Podolian Marmot* of Pennant; and the *Blind Rat* of Shaw.

Habits, &c.—This species, which the Russians name *Slepez*, or the blind, and the Cossacks *Sfochor Nomon*, signifying the same defect, burrows extensively beneath the turf, driving at intervals lateral passages in its search for roots, particularly that of the bulbous *Chærophyllum*. Openings to the surface occur at distances of some yards from each other, and there the earth is raised into hillocks, sometimes of two yards in circumference, and of considerable height. It works stoutly and rapidly, and on the approach of an enemy instantly digs a perpendicular burrow. Though it cannot see, it lifts its head in a menacing attitude towards its assailant, and, when irritated, snorts and gnashes its teeth, but emits no cry: its bite is very severe. In the morning it often quits its hole, and during the season of love basks in the sun with the female. It is worthy of notice that there runs a superstition in the Ukraine that the hand which has suffocated one of these animals is gifted with the virtue of curing the *king's evil* (as it is still called), in the same way that it was supposed to vanish before the royal touch of the Stuarts in this country.

Locality.—The southern parts of Russia, from Poland to the Volga, but not to the east of that river; common from the Sysran to the Sarpa; frequent along the Don, even to its origin, and about the town of Rœsk, but not in the sandy parts.

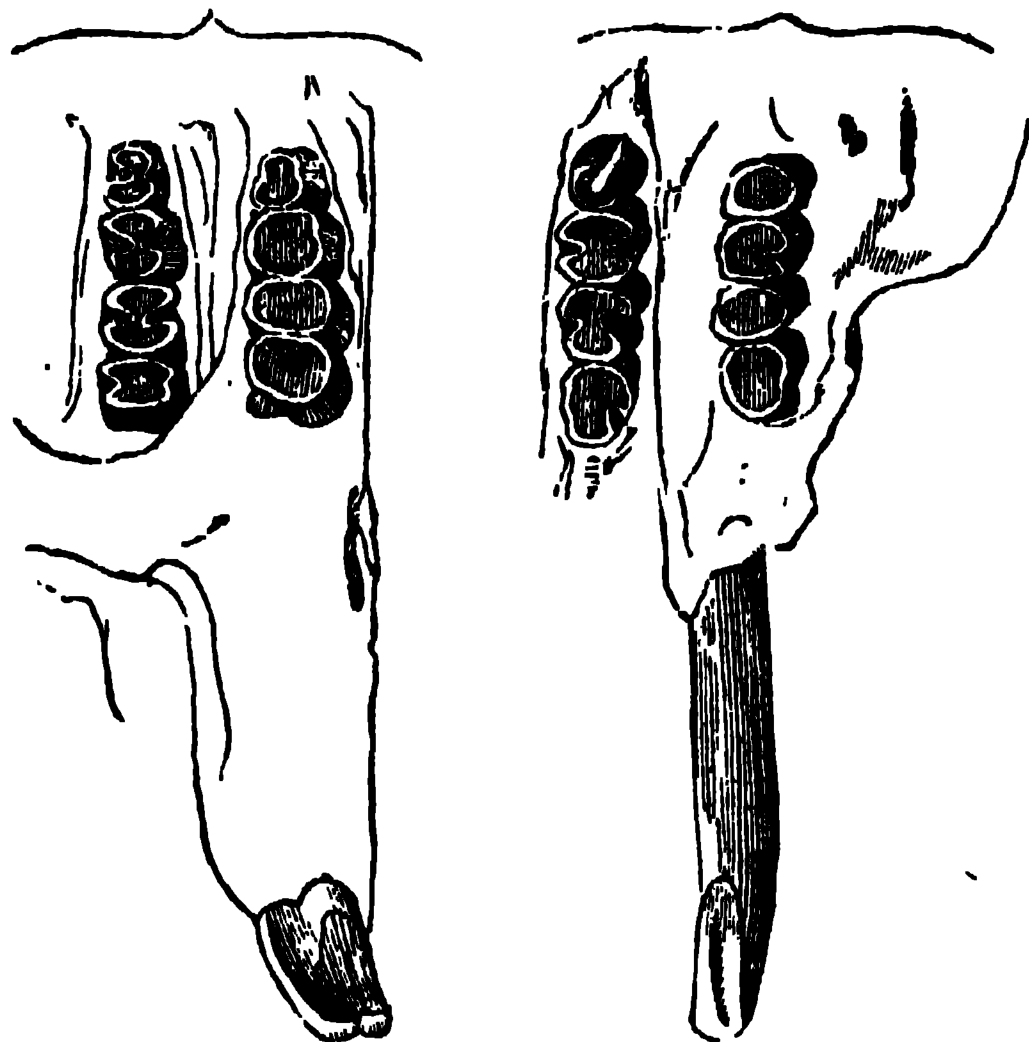


Aspalax typhlus.

Bathyergus (Brants; *Oryclerus*, F. Cuv.)

M. F. Cuvier assigns to *Bathyergus* only three molars in each jaw; whilst to *Oryclerus* he assigns four.

The Dental Formula of the first, according to this statement, would be:—Incisors $\frac{2}{2}$; molars $\frac{3-3}{3-3}$ = 16; and of the second, incisors $\frac{2}{2}$; molars $\frac{4-4}{4-4}$ = 20.



Teeth of Orycterus. (F. Cuvier.)

Dr. Fischer quotes Professor Kaup for the opinion that the *Bathyergus Capensis* of Brants (*Cape Rat* of Shaw and Pennant) and *Bathyergus maritimus* of Brants (*Coast Rat* of Shaw, *Orycterus maritimus* of F. Cuvier) are identical, the former being the animal in a comparatively early stage of life. The latter is the *Zand Moll* of the Dutch and *Kauw-howba* of the Hottentots: it is of a reddish grey or ash-colour above, and hoary beneath. Length from tip of muzzle to origin of tail, 1 foot 1½ inch; of tail without the hair, 1 inch 1 line; of the pencil of hairs, 10 lines. There is a variety all white.

Locality and Habits.—The sand-flats of the Cape of Good Hope, wherein it burrows in great numbers. In every part of those flats Mr. Burchell observed innumerable mole-hills, and his foot often sunk into their galleries: for this reason, he remarks, it is very unpleasant, if not dangerous, to ride on horseback in such places, as persons are liable to be thrown by the feet of their horses unexpectedly sinking into these holes.



Coast Rat.

The following genera are placed by Mr. Swainson among the Squirrels, and, indeed, there is much about them to indicate a near approach to that family of Rodents.

Not Pouched.

Arctomys. (Gmelin.)

Generic Character.—Head and eyes large; ears short; body stout; fore feet with four toes and an obsolete thumb, hind feet five-toed. Tail short. Upper surface of molars ridged and tuberculous.

Dental Formula:—Incisors $\frac{2}{2}$; molars $\frac{5-5}{4-4}$ = 22.

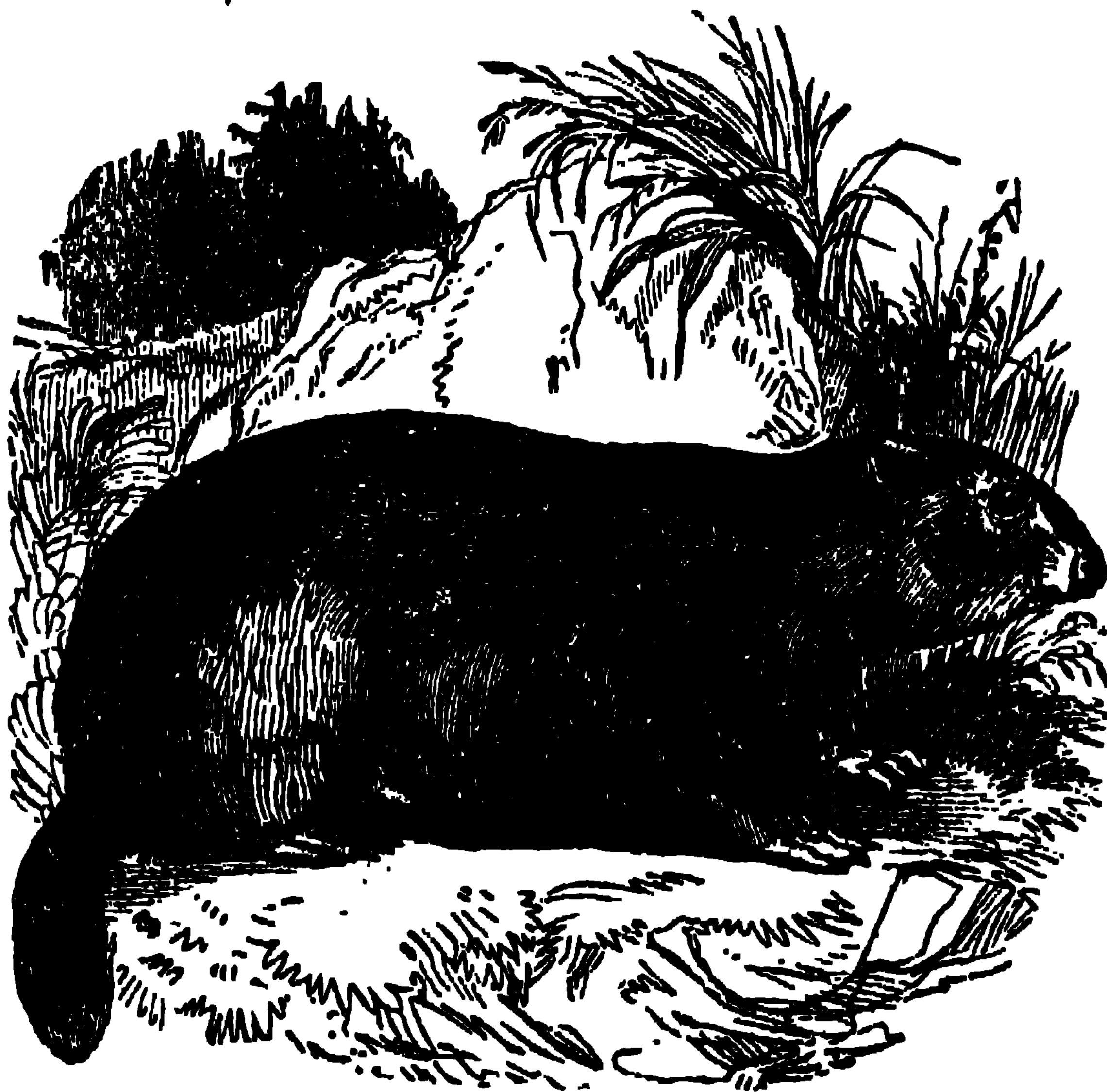
Examples, *Arctomys Marmota*, Schreb., and *Arctomys Empetra*, Schreb.: the latter as an example of the American Marmots.

Arctomys Marmota.—This is the *Mus Alpinus* of Gesner and others; *Mus Marmota* of Linnæus and others; *Glis*

Marmota of Klein; *Marmota Alpina* of Blumenbach; *Marmotte* of Buffon; *Murmelthier* of Kramer and of Meyer; and *Alpenmurmelthier* of Schrank.

Description.—Cheeks large; ears round and short, hid in the fur; body stout; head and upper parts brownish ash mingled with tawny; legs and under parts reddish; tail rather full; length from nose to tail, about 16 inches; of the tail, 6.

Habits, Locality, &c.—This well-known species is found in the Alps and Pyrenees, even, it is said, on the summits of those mountain-chains. They live in little societies, feeding on roots and vegetables, and occasionally on insects. Their holes are formed in the ground, generally with three chambers in the shape of a Y, with two entrances. These apartments are comfortably lined with moss and hay, and to them the Marmots retire about Michaelmas, having stopped up the entrances with earth, there to doze away the inclement months, till the warm suns and showers of April arouse them from their torpidity to partake of the renewed vegetation. From five to a dozen are said to be lodged in a chamber. They lift their food to their mouths with their fore-feet, eat it sitting, and will walk on their hind-feet. When on their feed a sentinel is placed to watch, and on the approach of danger his whistle drives them instantly to their subterranean retreats. They are playful creatures, but when angry or before a storm pierce the ear with their shrill whistle. Though they soon become tame, and will eat almost anything, they bite very hard when offended. Milk pleases them greatly, and they lap it with satisfactory murmurs. They become fat, and are sometimes eaten; but they are taken by the Savoyards and others principally that they may be exhibited by those itinerants. The number of young at a birth is generally three or four.



Alpine Marmot.

Arctomys Empetra.—Hoary above, mixed with black, and bright brown shining through; reddish orange beneath; head and feet blackish brown; cheeks whitish; ears flat, round, moderate; tail about half the length of the body, black at the tip. Length of head and body, from 17 to 20 inches; of tail (vertebræ), 5½ inches.

This is the *Quebec Marmot* of Pennant and Godman; the *Common Marmot* of Langsdorff; the *Thick-wood Badger* of the Hudson's Bay residents; the *Siffleur* of the French Canadians, who apply the same name to the other species of Marmot and to the Badger; *Tarbagan* of the Russian residents on Kodiak?; *Weenusk* of the Crees; *Kath-hillæ-Kooay* of the Chepewyans; *Mus Empetra* of Pallas; and *Arctomys Empetra* of Sabine and others.

Locality, Habits, &c.—Dr. Richardson, who gives the above synonyms, states that the Quebec Marmot inhabits the woody districts from Canada to lat. 61°, and perhaps still farther north. He says that it appears to be a solitary animal, inhabits burrows in the earth, but ascends bushes and trees, probably in search of buds and other vegetable productions, on which it feeds. Mr. Drummond killed two, one on some low bushes, and the other on the branch of a tree. According to Mr. Graham it burrows perpendicularly, selecting dry spots at some distance from the coast, and feeding on the coarse grass which it gathers on the river-sides. The Indians capture it by pouring water into its holes. The flesh is considered delicate when the animal is fat. The fur is valueless. It much resembles the *Bobac* of Poland in form and general appearance. (*Fauna Boreali-Americana.*) Pennant says, 'Mr. Brooks had one alive a few years ago; it was very tame, and made a hissing noise.'



Quebec Marmot

N.B. This species has a slight folding of the lining of the mouth, forming the rudiment of a cheek-pouch. (Richardson.)

Pouched.

Spermophilus. (F. Cuvier.)

Dental Formula as in *Arctomys*. the molars are narrow. Cheeks with large pouches. Toes narrow and free. Heel covered with hair, hind toes naked.

Example, *Arctomys* (*Spermophilus*) *Parryi.*

Description.—Ears very short, body thickly spotted above with white on a grey or black ground, pale rust-coloured beneath, face chestnut-coloured, the tail one-third longer than the hind feet, stretched out flat, black at the extremity, with a narrow white margin, rust-coloured beneath; length of head and body 8 inches 6 lines, of tail (vertebræ) 1 inch 6 lines.

This, according to Dr. Richardson, who first named the species, is the *Ground Squirrel* of Hearne; the *Quebec Marmot* of Forster; the *Seek-Seek* of the Esquimaux; the *Thæ-thiay* (Rock Badger) of the Chepewyans; and the *Arctomys Alpina* of Parry's 'Second Voyage.'

Locality, Habits, &c.—The Doctor informs us that this Spermophile inhabits the barren grounds skirting the sea-coast from Churchill in Hudson's Bay round by Melville Peninsula, and the whole northern extremity of the continent to Behring's Straits, where specimens precisely similar were procured by Captain Beechey. It is abundant in the neighbourhood of Fort Enterprise, near the southern verge of the Barren Grounds, in lat. 65°, and is also plentiful on Cape Parry, one of the most northern parts of the continent. It is found generally in stony districts, but seems to delight chiefly in sandy hillocks amongst rocks, where burrows, inhabited by different individuals, may be often observed crowded together. One of the society is generally observed sitting erect on the summit of a hillock, whilst the others are feeding in the neighbourhood. Upon the approach of danger, he gives the alarm, and they instantly hurry to their holes, remaining however chattering at the entrance until the advance of the enemy obliges them to retire to the bottom. When their retreat is cut off, they become much terrified, and, seeking shelter in the first crevice, they not unfrequently succeed only in hiding the head and fore part of the body, whilst the projecting tail is, as is usual with them under the influence of terror, spread out flat on the rock. Their cry, in this season of distress, strongly resembles the loud alarm of the Hudson's Bay Squirrel, and is not very unlike the sound of a watchman's rattle. The Esquimaux name is an attempt to express this sound. Hearne states that they are easily tamed, and very cleanly and playful when domesticated. They never come abroad during the winter. Their food appears to be entirely vegetable; their pouches being generally filled, according to the season, with tender shoots of herbaceous plants, berries of the alpine arbutus, and of other trailing shrubs, or the seeds of grasses and leguminous plants. They produce

about seven young at a time. (*Fauna Boreali-Americana.*) Dr. Richardson's figure, from which the cut is taken, was drawn from a specimen procured from the banks of the Mackenzie.



Spermophilus Parryi.

The genus *Aulacodus* of Temminck is placed by Dr. Fischer between *Dipus* and *Arctomys*.

Mr. Waterhouse, in his interesting 'Observations on the *Rodentia*, with a view to point out the groups, as indicated by the structure of the *Crania*, in this order of Mammals' (*Mag. Nat. Hist.*, 1839), states the following as the principal genera of his section *Murina: Sciurus, Arctomys, Myoxus, Dipus, Mus, Arvicola, Geomys*, and *Castor*. The principal genera in the section *Hystricina* are, according to the same author, *Bathyergus, Poephagomys, Octodon, Abrocoma, Myopotamus, Capromys, Echimys, Aulacodus, Hystrix, Dasyprocta, Chinchilla*, and *Hydrochœrus*.

In the 'Zoology of H.M.S. Beagle' (Sept., 1839), Mr. Waterhouse says that he has been induced, by the differences there pointed out in the molar teeth of the two groups, to separate the South American Mice from those of the Old World, or rather from that group of which *Mus decumanus* may be regarded as the type, and to place them, together with such North American species as agree with them in dentition, in a new genus bearing the name of *Hesperomys*. Mr. Waterhouse will not venture to say whether this group be confined to the western hemisphere or not; but he thinks that he may safely affirm that that portion of the globe is their chief metropolis. In the species of *Hesperomys*, he observes, the molar teeth are always rooted; and in the form of the skull and lower jaw they agree with the *Muridæ*, and do not present the characters pointed out by him as distinguishing the *Arvicolidæ*; and, as regards the cranium and lower jaw, it is only in the genus *Neotoma* that any approach is evinced, in his opinion. Under the family *Octodontidæ* he places the genera *Ctenomys, Poephagomys, Octodon*, and *Abrocoma*, which last he states to be allied on the one hand to the genera *Octodon, Poephagomys*, and *Ctenomys*, and on the other to the family *Chinchillidæ*. The *Octodontidæ* appear to him to bear the same relation to *Echimys* as the *Arvicolæ* do to the *Muridæ*. [Rodentia.]

Mr. Waterhouse has also characterised a new species of Hamster, *Cricetus auratus*. (*Zool. Proc.*, 1839.)

Fossil Muridæ.

Arvicola. (Lacép. *Lemmus*, Link.)

1. *Campagnol des schistes de Bohème* (Cuv.). Bohemia. 2. *Campagnol des Cavernes* (Cuv.). Bone-caves, Kirkdale. (Buckland, 'Reliqu. Diluv.') 3. *Petit Campagnol des Cavernes* (Cuv.). Bone-caves, Kirkdale (Buckland, 'R. D.'), where it would seem that there may be other species. *Arvicolæ* also occur in the Bone Breccias of Cette, Nice, Corsica, and Sardinia; in the tertiary of Puy de Dome? and in the Bone-caves of Gailenreuth, Sundwick, &c.

Dr. Buckland notices the extreme abundance of the teeth of *Water Rats* in the Kirkdale Cave. The same author remarks that the teeth and bones of *Water Rats* had been found by Cuvier to occur abundantly in many of the osseous breccias from the shores of the Mediterranean and Adriatic, and that the Baron had also in his collection a large mass from Sardinia, composed exclusively of the bones and teeth of these animals, nearly as white as ivory, and slightly adhering together by delicate stalagmite. (*Reliquiæ Diluvianæ.*)

Myoxus.

1. *Loir des plâtrières* (Cuv.), Gypsum of Montmartre. 2. *Second Loir des platrières* (Cuv.), Gypsum of Montmartre. 3. *Myoxus primigenius* (Meyer, *Arctomys primigenia*, Kaup). Another *Myoxus* is recorded from the Œningen beds. Dr. Buckland, in his 'List of Vertebral Animals found in the gypsum of the Paris Basin,' records two small species of Dormouse, those above noticed in all probability, as extinct species.

Mus.

1. *Mus Musculus fossilis* (Karg). Œningen beds. Remains of Mice have also been found in the bone-caves and osseous breccias. Thus Dr. Buckland describes and figures ('Reliq. Diluv.,' p. 15, pl. 11) the jaw and teeth of a mouse from Kirkdale Cave. In the Eocene formation (lacustrine) of Cournon, in Auvergne, a *Rat* is recorded as one of the animals found with the fossil eggs of aquatic birds.

Cricetus. [Hamster.]

Dipus. (*Gerbillus*, Desm.; *Meriones*, Ill.)

Remains of this form are recorded in the Tertiary beds. Bean iron-ore of the Rauh Alp. (Jæger.) Russia. (Fischer.)

Ctenomys.

Mr. Darwin found at Bahia Blanca, in a cliff of red earth, part of the head of a *Ctenomys;* the species being different from the Tucutuco, but with a close general resemblance.

Spermophilus.

Spermophilus superciliosus (Kaup). Tertiary: Eppelsheim sand.

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